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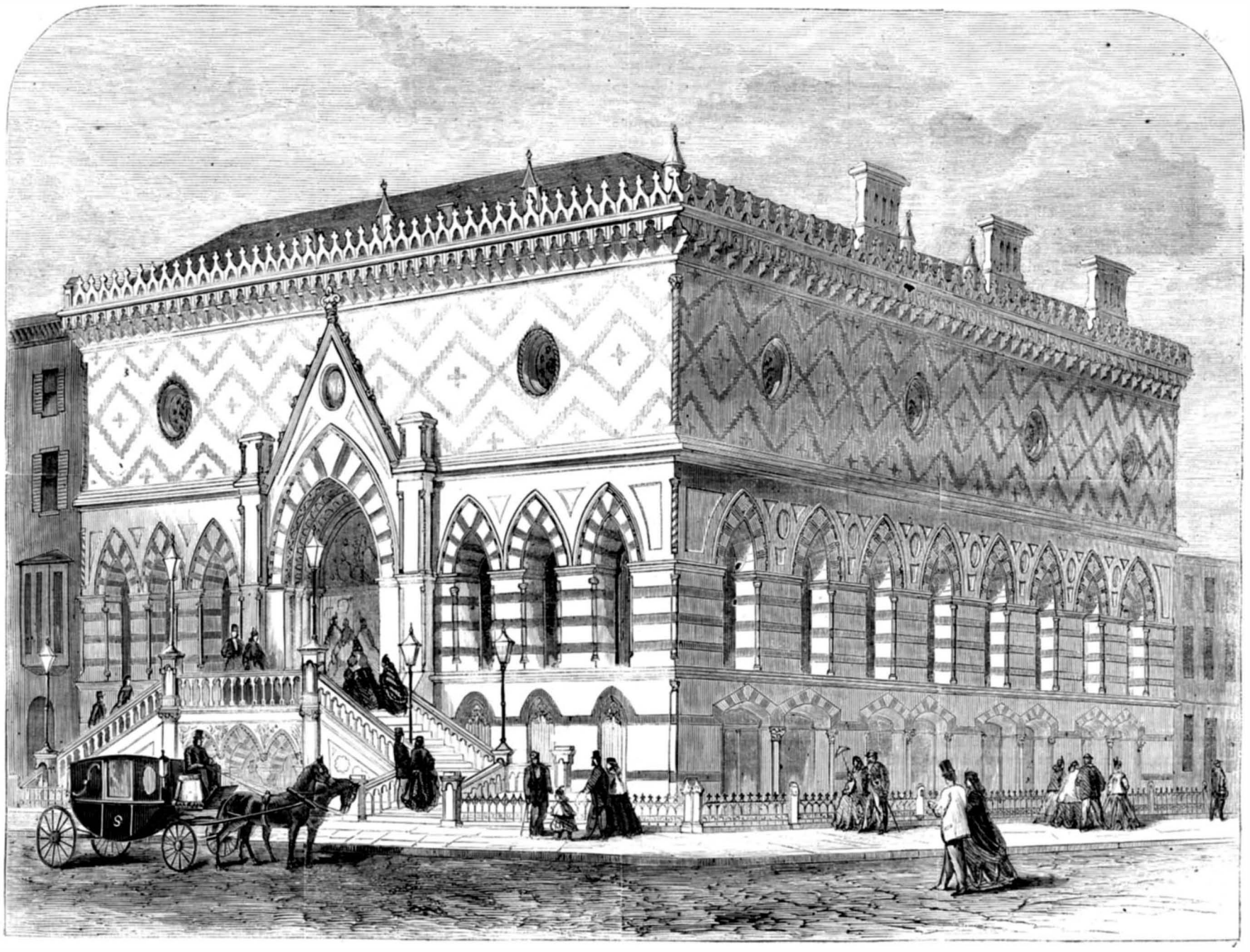
National Academy of Design.

Forty-two years ago the resident artists of the city of New York united in forming a "Drawing Association," having for their object the study of art and social intercourse among the members. The Association prospered in such a degree that, during the following year, their organization was extended and perfected, and in January, 1826, they adopted the name of the National Academy of Design, soon after obtaining a charter from the State Legislature. Although thus auspiciously inaugurated, the subsequent record of the society shows for many years a varied and precarious existence, with no permanent abiding place, but removing from place to place, as convenience or circumstances dictated, holding its annual exhibitions with commendable regularity, but too often attended with pecuniary loss to the members. But two years since marks an important era in the history of the organization as witnessing the completion of the magnificent edifice located on Twenty-third street, corner of Fourth Avenue, and represented in the accompanying engraving.



NATIONAL ACADEMY OF DESIGN.

The building is eighty feet wide on the street, and ninety-four feet long on the avenue, and stands three stories high. On the ground floor are the janitor's rooms and the apartments occupied by the School of Design, including three studios or alcoves on Fourth Avenue, a hall for casts and models, and the spacious rooms of the Life school.

The story above is devoted to the reception rooms, library, and the commodious lecture hall. This floor is reached by a a double flight of marble steps on the Twenty-third street front. The principal doorway is surmounted with a broad archivolt enriched with sculpture and varied by alternately white and gray voussoirs. The supporting pillars, two on either side, are of red Vermont marble with white marble capitals and bases.

Entering at this main entrance, passing through the vestibule, a double flight of broad stairs leads to the grand hall on the upper story. This hall measures thirty-four by forty feet, and is divided by a double arcades supported on columns of polished marble. Here are hung the works of art belonging to the Academy, and opening out of it are the exhibition galleries, four in number, and the gallery of sculpture.

The halls and vestibules throughout the building are floored with mosaic of tiles. The stairs, doors, windows, and door and window trimmings, are of oak and walnut combined oiled and polished. On the exterior, the basement walls are of Westchester gray marble with bands of North River graywacke. The white marble of the first story walls is similarly banded. The walls of the third story have a checkered pattern, being built up of small oblong blocks of white and gray marble. The School of Design is lighted by double windows with segmental arches, the middle supporting column having richly carved capitals and bases. The archivolts of all the windows are decorated by voussoirs of alternately white and gray marble. In the upper story there are no windows, but circular openings for ventilation, filled with elaborate plate-tracery. Under the platform of the principal stairway is a triple arcade inclosing a drinking fountain, and having decorations of sculpture, which, with the elaborate mosaics on the tympanum above the main door, give a richness to the front of the edifice to which an engraving of this character can not possibly do justice.

The style of architecture may be designated the "revived Gothic," embracing the features of the different schools of architecture of the Middle Ages, which are most appropriate for our buildings of modern date. The building was designed by, and erected under the supervision of, Mr. P. B. Wight of this city. All the exquisite sculpturing throughout the building was executed under his directions by stone-carvers who cut each leaf and flower from natural models gathered from the woods and fields. The contract for the building did not include this work, but the whole was paid for by the day, a special appropriation being made for this purpose. The result has been the adornment of a building which, thus completed, stands as an honor to the city, and well sustains its character as the first Academy of Fine Arts on this side of the Atlantic.

New Chemical Toy.

"Pharaoh's serpents" and "Vesuvian tea" have paved the way for the reception of a new Chinese wonder in the shape of "ferns growing out of burning paper." This is a neat little experiment, free from many of the disadvantages appertaining both to the "Devil's tears" and the lozenge-shaped crystals of bichromate of ammonia, which may chance to prove too inviting to children's tastes. The instructions direct us to crimp or fold the yellow papers backwards and forwards, so that when opened out they may be supported upright in a zig-zag form. One of these slips is then placed upright on a plate, and ignited in two or three places along the upper edge, but without being allowed to blaze. It will burn slowly down with a red glow, diffusing an agreeable perfume, while the ash of the paper assumes the most fantastic arborescent shapes, together with a green color, which, to a lively imagination, may be suggestive of the growth of ferns or lichens. We had no difficulty in imitating this effect by saturating thin cartridge paper, in the first instance, with an alcoholic solution of gum benzoin, and, when dry, applying an aqueous solution of the bichromate of ammonia. The decomposition of the latter substance by heat in contact with burning paper affords an explanation of the phenomena observed.—*Chemical News.*

SELF-ACTING GUN CARRIAGE.—The invention of Captain Moncrieff (Scotland) for gun carriages, is designed to utilize the force of the recoil to throw the gun into covered position for reloading, and afterward to return it to position *en barbette* by means of a residue of the same force stored, as it were, in a counter weight which is raised by the recoil; regulating the recoil and then aiding the return.

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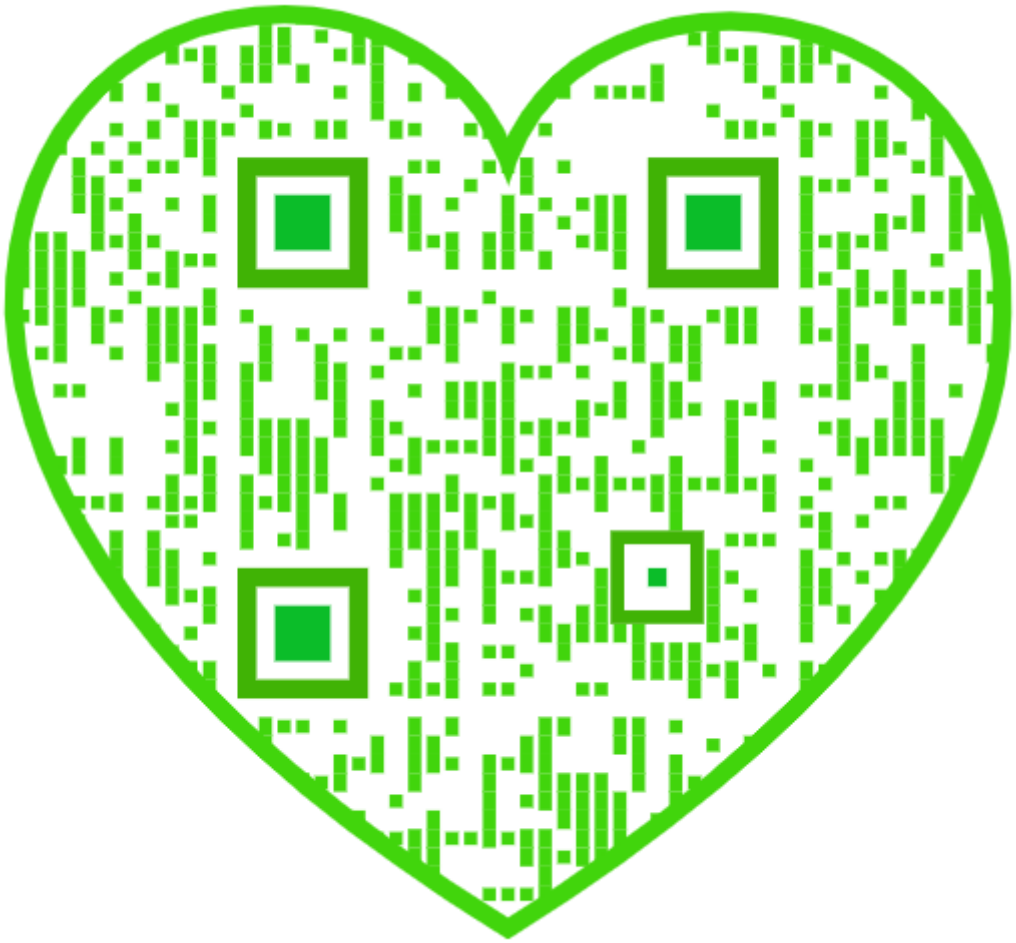

SOUTH-WEST ALLEGHANIES.

VEGETABLE DEVELOPMENT—GRAPES, FRUITS, FROSTS—WATER POWER.

As public attention is now directed to the South as the future field upon which Northern enterprise is to expend its energies, all well-ascertained facts become of importance.

The progress of vegetable development is a question of great moment when considered in connection with its relations to the different altitudes of the mountains, and the production of certain articles which are to become future staple commodities in the trade of the country.

Difference in elevation has the same influence, relatively, upon the advancement of vegetation that is produced upon it by difference of latitude. To the horticulturist, a careful investigation of this subject is of more than ordinary interest.

Take the facts as they were collected. Leaving Cincinnati on the 10th of March, 1859, I found the vegetation still locked up in the embrace of winter, though the weather for many days had promised an early spring. On the 11th, at Louisville, the buds of the swamp elm, the swamp maple, and sweet gum, were considerably swollen, and the blossoms of the elm forming. On the 12th, at Smithland, Ky., the peach blossoms were out, the leaves of the apple tree forming, and the lilac in leaf. From thence to Murphy, Cherokee county, North Carolina, I found the vegetation in the valleys gradually progressing. Here my investigations assumed a systematic form.

On the 27th of April, a special examination was made of the relative progress of vegetation between the valleys and the mountains. The point selected was the head of Valley River, where I had previously made a measurement of the hight of the mountain intervening between that river and the Nantahala River. In the valley, the leaves of the forest trees had attained half size. In ascending the mountain they gradually diminished, so that at the hight of one thousand feet, they were about the size of the feet of rats. This, however, was only in the more advanced trees, while in others the buds were just beginning to swell, but had not bursted. At two thousand feet above the valley all the trees seemed unconscious of the presence of spring. The plants and grasses at that elevation, were pretty well forward, because the sun's heat had reached their roots and quickened them into life.

On the 9th of May, this point was again examined. The leaves on most of the trees in the valley had attained their full size, and at one thousand feet they were at half size; while at two thousand feet they were but little advanced and none of them larger than rat's feet. Thus it appears that there is at least two weeks' difference to each thousand feet in the vegetable progress in these mountains. From two thousand to three thousand feet, the buds of the trees on the day named were only beginning to swell, while the grass was well up the whole distance and some of the flowering plants in full bloom.

To verify the deductions made up to the 9th of May, the investigations were extended, on the 20th of the same month, to Tusquitta Mountain, ten miles south of Valley River. The trip was made in company with a hunting party. Vegetation, of course, was in advance of what I found it on the 9th; but it was advanced in the third thousand feet only to the condition prevailing in the second thousand at the latter date.

The oak leaves were yet very small as we neared the summit of the mountain, and still retained their varied hues of red. They would not be fully spread and assume their summer's green, I was assured, until the first of June. The leaves of the chestnut were about one-fourth size, being in advance of the oaks. The grass and common herbage was in fine condition, and the strawberries in bloom. The stock raisers of the valleys were driving their cattle to the prairie grounds on the mountain's summit, to leave them there until winter without any other attention than an occasional supply of salt.

It may be considered a well-ascertained fact, that there is about two months' difference between the progress of vegetation in the valleys and upon the summits of the highest mountains in the section of country under consideration. The intelligent horticulturist will know how to take advantage of this condition of things.

A few facts will serve to show the adaptation of this section of country to wine making and the cultivation of fruits.

Near sixteen years since, Mr. N. E. Guerin, an educated and intelligent French gentleman, settled in the southwest Alleghanies. Soon his attention was directed to the abundance of the wild-grape vines which he found growing luxuriantly at different elevations in the mountains. From this fact he was induced to attempt the cultivation of the grape, with an intention of entering upon the manufacture of wine. Before his arrival several Swiss and Germans had attempted vine culture in the valleys, but it had turned out badly. Having spent a long time in the vine country of south and middle France, M. Guerin hoped to overcome the difficulties which had discouraged his predecessors; and, accordingly, began his vineyards on the declivities of the hills, about six hundred to eleven hundred feet above the valley of the Ocooe River. In these situations the effort has been very successful, mildew and rot, which had been so destructive in the valleys, never affecting the grapes, and frost very seldom killing the fruit buds. The vine here, M. Guerin says, produces a third more than in France, and the wines may be made of as good quality, differing only in *bouquet*. They keep very well, and, like those of France, improve in quality by age. He depended mainly on the Catawba and Isabella grapes, both of which are natives of the mountain range upon which he is located.

That the highlands of Tennessee and the mountains of North Carolina can be made to yield the peach to the greatest perfection, is a question about which there is no longer any doubt. The only obstacle at present to the extended cultivation of the peach in the South, for the markets of the North, is the want of railroad facilities for transportation. This difficulty may now be overcome; and then the only remaining problem will be whether the peach crop will be as certain as that of corn, or but once in every three to five years, as at the North.

This brings me to the consideration of the subject of the extent and effects of the frosts in these mountain regions, a point that has been but partially understood or examined. I found a number of places in the mountains where peach orchards had borne for nearly twenty years without any failures, except from winter freezes—no white frosts ever having fallen upon the vegetation.

In the valleys, and extending to a hight of about three hundred feet above the beds of streams, the white frosts are severe: but the next four or five hundred feet above the first three hundred is found to be exempt from white frosts. So definite is this rule, that in corn fields and among the ordinary wild vegetation everything in the valley and upward through the first belt, may be killed down, while all in the next belt remains perfectly green, sometimes the lower half of a plant being killed while the upper half remains unaffected. Thus, all orchards and vineyards in this upper belt are exempt from the action of the white frosts, and continuous annual crops are rendered secure.

At one time, when it was the fashion to disparage the South, I listened to a harangue from a member of Congress at Portland, Me., who, among other assertions, declared that the South had no water power, and that the establishment of manufactories, to any considerable extent, in rivalry of New England, could never be effected. Well, having then but recently returned from the South-west Alleghanies, I was surprised to find such gross ignorance of its natural resources.

Take a few facts as to one of many similar localities. Take Cherokee county, North Carolina. First, there is the Little Tennessee River bordering it on the east, with a number of creeks running into it upon the east; then Cheoah River, made up of Tellulah, Long Creek, Atoah, Big Snowbird, Little Snowbird, West Buffalo, Santeetlah and Slick Rock Creeks, on the west, with one or two on the east; then Valley River, with its tributaries; Hiwassee River, with Peach Tree, Fier's Creek, Tusquitta and Shooting Creeks, on the east, and several others on the west; then Notley River, and other streams which it is needless to enumerate. The amount of water in many of the creeks is ample for water power, and the rivers, if not available, will be useless because of a superabundance of water.

The fall in many of the mountain streams is very considerable, often fifty to eighty feet to the mile and sometimes more. The rivers have a proximate uniformity of fall, that may be understood from the investigations in relation to one of them. The Ocooe River, for a distance of twenty-four miles, from Ducktown Copper Mines to Park's Mill, has a fall of nine hundred and sixty-four feet, or about forty feet to the mile. From thence to its junction with the Tennessee River, the fall is sixty-two feet, and the distance about twenty-five miles. The other rivers being equal to the Ocooe in the amount of fall they possess, it will be easy to estimate their adaptation to manufacturing. And when the mildness of the climate, the healthiness of the country, and its central position between the grain-growing and cotton districts is considered, it needs no prophet to foretell that this region must one day be the Manchester of the United States.

In relation to timber, it is only necessary to say that the varieties are the same that prevail throughout Tennessee, Kentucky, Ohio, and Pennsylvania, only that in many of the coves and mountain sides, the trees are often much superior in size and symmetry. As a store house of ship timber, the section of country under consideration has few rivals in any other part of the country, oak being the prevailing timber.

D. C.

Coloring Steel and Other Metals.

[For the Scientific American.]

Besides transparent varnishes, which are sometimes used to give different shades of color to metals, and which are liable to the objection intimated in my note, page 354 of the present volume, of being removed by use, there is another method which consists of covering the metal with a very thin film of its oxide, sulphide, phosphide, etc., or with some other metal: the color produced by such film is a result of the interference of the luminous rays, and is produced by the same cause as the color in the soap bubble, in the mother of pearl, or in the rings seen when a glass lens of very slight curvature is pressed on a flat piece of plate glass, and which are called the rings of Newton, as he first discovered them and attempted an explanation.

These almost incomprehensibly thin films show no colors when their thickness is 1-200,000th part of an inch or less, as Newton has demonstrated: when 1-180,000th part thick they show a yellow color; when 1-165,000th, orange; 1-150,000th, red; 1-135,000th, violet; 1:120,000th, indigo; 1-100,000th, blue. These quantities correspond with the length of the luminous waves, and this correspondence is the cause of the color. When the thickness of the film becomes greater, the series of colors is repeated several times, with slight modifications.

The same series of colors show themselves in different circumstances, as by the tempering of steel, in which case the temperature required to give to the steel the right degree of hardness for its especial destination is recognized by the color it takes under the influence of a well-regulated heat, and this test is for the practical workman more reliable than probably could be found by the thermometer. Steel first heated and then suddenly cooled is too hard for most purposes, and is to be tempered afterward: to do this, part of the object is cleaned and made bright, in order to observe the color of the film of oxide which covers it when it is reheated.

When steel is not tempered afterward, but left as hard as the first heating and sudden cooling down makes it, it is called glass hard: this is the case with files. Other tools for working metals are very slightly tempered, till they show a pale straw yellow color, which indicates a temperature of 380° Fah.: razors are tempered straw yellow color, which indicates a temperature of 410°; chisels for carpenters, yellow, 446°; penknives, brown yellow, 432°; common knives, dark pink, 500°; swords, blue, 530°; watch springs, deep blue, 555°; loss of all hardness, dirty or greenish white, 600. If the last case happens by carelessness, the heating to some 1000° and sudden cooling has to be repeated, in order to make the steel glass hard first before tempering.

In some special cases the hardening and tempering is done by one single operation, namely, heating the steel only to 700°, 800° or 900° and then suddenly cooling, in which case the hardness will be greater in proportion as the heat was greater.

The hands of watches and clocks and other small objects are made blue or dark pink in the same manner, not for the sake of tempering but as a preventive against rusting. The best way to color such small objects is to lay them on a heavy piece of iron made hot beforehand: they are then easily watched, and will be seen to become successively yellow, brownish, reddish, violet, blue, and must be removed from the iron just before the desired color is ready to appear.

Another method is to cover iron with a thin coating of sulphur of phosphorus, or rather, not with the substance itself but a compound of it with the iron, thus properly, to coat it with sulphide of iron: so the beautiful blue protective coating of the Russian sheet iron is nothing but phosphide of iron.

The same series of colors are seen in the silver daguerreotype plate when it is exposed to the vapor of iodine: the thin film of iodide of silver during its steadily increasing thickness exhibits the very same color as we see in tempering steel, only purer, as the silver is a whiter metal. Such a plate will show in succession the same series mentioned above—straw yellow, dark yellow, reddish pink, violet blue, greenish, white, straw yellow, reddish, and then comes about the same series again: but it is a singular fact, of which very few photographers who practice the daguerreotype process are aware, that not only the first thin yellow and reddish film is sensitive to light, which property is not shown by following films, but that again the afterward-appearing much thicker film of yellow color is again sensitive to the chemical luminous impressions.

An entirely different and much more beautiful method of producing these colors is by the chemical action of the galvanic battery. This was first discovered by Nobili, who connected a bright metallic plate with one pole of the battery, and with the other pole he connected a platinum point, and then immersed both plate and point in a solution of some metallic salt. When the point was kept very near to the metallic plate without touching it, colored rings were formed on the plate around the point, similar to the rings of Newton above mentioned, and of which the color depended also on the thickness of the deposit, which was either the oxide of the metal itself or a precipitate from the solution, according to the connection of the metal with the positive or negative pole of the battery.

Becquerel has made a practical application of the principle, in covering easily oxidizable metals with a preserving coat of oxide, in place of covering them with a film of gold or platinum: he found that a coating of peroxide of lead or of iron is a preservative which withstands the action of great heat, as these oxides are almost fire proof. The only difficulty to solve was, how to make these coats of oxide adhere well to the metal, and he found that when the solution is made by dissolving these oxides in alkalies the desired adhesion is obtained.

The lead solution is obtained in boiling three parts of litharge in forty parts of water and four parts of caustic potash; when cold add forty parts of water, and pour it into a porous cup, in which the metal to be covered is suspended, after being carefully cleaned and made rough with pumice stone. The porous cup is placed in water acidulated with one twentieth part of nitric acid: a metallic plate is plunged into this and connected with the negative pole of a simple constant galvanic battery, of which the positive pole is connected with the metal to be covered. The water is decomposed, its oxygen unites with the protoxide of lead, which is carried to the metal, so that this is not oxidized but in the course of a few minutes covered with a beautiful dark brown coat of peroxide of lead, which adheres so strongly that it can stand the friction of a burnisher.

The iron solution is made by heating the protosulphate (green vitriol) in liquid ammonia: it is used in the same way as the lead solution. The deposit is first brown red, becomes darker when the thickness increases, and in the course of several hours forms the color which the painters call "Mars red." But those thick films have not so much adherence, and it is better to stop the operation in a few minutes, as soon as the red coating becomes visible. It must be remarked that copper cannot be coated by this solution by reason of its peculiar affinity for ammonia.

When the intention is only to color the metals with a very thin coating of peroxide of lead, the operation is simple. Saturate a solution of potash with peroxide of lead, connect the metal to be colored with the positive pole of a battery and place it in the solution, connect the negative pole with a platinum wire, and move the end of the wire about the neighborhood of the metal to be colored: when keeping the point of the wire on one place the rings of Nobili above mentioned are produced. By placing this platinum wire in a

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glass tube, so that only the extreme point projected, and then the electricity was allowed only to escape from the point, Becquerel produced designs in different colors on the metal. These colors are very beautiful, and being produced by an exceedingly thin transparent film, are modified by the metal on which they are deposited. Gold, silver, copper, platinum, steel, brass, britannia ware, etc., or gilded, silvered and coppered objects, in this way receive the brightest colors, and the success depends in a great measure on the previous careful cleaning of the metal which is to receive the deposit: touching with the fingers will interfere with the results, but if the operation fails, all one has to do is to place the metal in acetic acid, which dissolves and removes this oxide of lead, and it may be recommenced. Also a copper solution has been recommended in place of the lead solution. It is prepared by dissolving four parts of blue vitriol and six parts of white sugar in eighteen parts of water, and adding so much caustic potassa as to redissolve the precipitate of oxide of copper which is at first formed.

When the battery is too strong, a yellow deposit results, which peels off. Six small cups of Smee's battery, filled with water only slightly acidulated, perform the operation in from one to two minutes.

It is found that when metals thus covered are exposed to acid or ammonia exhalations the film is changed in the course of time. To obviate this difficulty Becquerel covers the objects with a varnish overcharged with oxygen. To prepare this varnish he exposes for two hours to a moderate heat two pounds of linseed oil mixed with two drachms of litharge and half a drachm of sulphate of zinc, and filters. Apply with the brush: if too thick dilute with spirits of turpentine or benzine. V.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, January 24th, Prof. Tillman presiding.

The Chairman presented his usual summary of scientific items, some of which may be thus briefly referred to. The French Government have made a late survey of the Brazilian coast in which there were taken 178,000 angles and 160,000 soundings. Alexander Herschell has succeeded in obtaining a spectrum of a bright meteor and the spectra of meteor tails and finds the metal sodium present in the state of vapor. A small and perfect plant has been found in Hot Creek district, Nevada, which seems to thrive only in water so hot that the hand cannot be held in it. The London Pneumatic Company can send 120 tuns of goods through 18 miles of tubes every hour by means of atmospheric pressure at a cost of one penny a tun per mile. A meteorite weighing nearly 1,600 pounds has lately been sent to Paris from Mexico. Mr. Dauge of the Academy of Science, Brussels, finds that the refraction of the emergent rays in the atmosphere exterior to the sun's photosphere may augment the apparent diameter of the sun, and the mean period of its rotation, also retard the apparent motion of a spot in proportion as it recedes from the sun's center; this may account for some recently observed phenomena. The number of cases of cattle disease in Holland in December last was more than double the number in December, 1865, and its reappearance is reported in England where the pecuniary loss to the agricultural community on this account has already reached £3,500,000. Dr. Louvel has satisfactorily demonstrated the fact before a French Commission that animal and vegetable substances can be kept unchanged for any length of time in a vacuum. Professor Wyman, after careful measurement avers that the accuracy of workmanship of the bee has been greatly exaggerated and that the typical form of the cell is rarely realized. A memoir on blood relationship in marriage by Dr. Mitchell is published by the London Anthropological Society, in which the writer shows that consanguinity in marriage injures the offspring, the effect being enfeebled constitutions, bodily defects, impairment of the senses or nervous system, and sterility.

STAVELESS BARRELS.

A cylindrical barrel of novel construction was shown, designed for holding coal oil, and built up of thin strips of white oak laid across each other and held together with glue or cement. The veneers, of any desired width, are laid on spirally around a mold till a perfect cylinder twelve or fourteen layers thick is formed. The heads are made in a similiar manner, and when completed the barrel is perfectly tight, of great strength, weighs but little, is manufactured in less time and can be put into market at one-fourth the cost of any petroleum barrel now in use.

STEAM BOILER EXPLOSIONS.

This was the subject of a valuable paper read by Mr. J. A. Miller, in which he discussed the theory of explosion and proposed a plan for their prevention. The action of the sun on the surface waters of the ocean in causing evaporation, was used as an illustration wherein steam or vapor of water rises into a kindred element free from violence. In an engine boiler, on the other hand, the heat is applied below the water and must force its way up through a dense medium, but not before the whole liquid has been charged with as much steam as it can hold, and still further to impede its progress the makers fill nearly the whole steam space with tubes. When the liquid mass is surcharged the vapor cannot be released until either the pressure is relieved or its power of expansion is increased by heat, and this immense power stored in the water is the admitted cause of boiler explosions.

A REMEDY SUGGESTED.

The speaker referred to some diagrams he had prepared showing his new system of constructing cylinder, cylindrical flue, upright, tubular, and the American steam boilers, so that the atoms of steam as formed are mechanically carried directly into the steam space, and thus separated from the water will easily rise into their own element no matter what the pressure. As the result, steam is made rapidly, and the boiler contains water free from steam and steam free from water, and even if a rupture takes place it is simply a relief of pressure rapidly or slowly, and the effect is no more disastrous than the giving way of a steam pipe distant from the present boiler.

BEET ROOT SUGAR.

By appointment, Dr. Hirsch read an able and exhaustive article on the above subject; giving the history of its introduction into France, the patronage its manufacture received from Napoleon I., and the opposition it encountered from the English sugar merchants, and detailing at some length the best mode of cultivation and the various processes of manufacturing. The discussion of the several points brought forward in these two papers was laid over for one week.

Editorial Summary.

A UNITED STATES VESSEL FOR THE COLOMBIAN NAVY.—Our readers will remember a very swift vessel named the *R. R. Cuyler*, which at the beginning of the war was engaged in the trade between New York and Savannah, but was purchased by the United States Government for $165,000, and placed in the navy. She was a terror to blockade runners on account of her speed, and during the war captured some important prizes. At the close of the war she was sold at auction in New York, and her new owners, changing her name to the *Rayo* (lightning), placed her in the New Orleans trade. She has recently been purchased by the Colombian Minister for his government, and is to be armed with six 9-inch Dahlgren's, and two sixty pounder rifled Parrotts. She is 538 feet long, 32 feet breadth of beam, and registers 1202 tunnage, and is to be manned by a complete crew of Americans.

GWYNNE'S PUMP has been sucessful in raising upwards of thirty sunken vessels in British waters. The steamship *London*, sunk in the river Tay in November last, on the 22d of December was raised to the surface in twenty minutes, and with some delay in attempting to cut away a bulkhead that held back the water in the forecastle, the ship was ready to be taken in tow and floated up the river in less than two hours after the first stroke of the pumps. The pumps used were two with twelve-inch and one with nine-inch suction pipes, placed on vessels alongside, and a four-inch and a nine-inch placed on board the *London* after she rose to the surface. The vessel had been sunk by a collision, and the hole in her hull, as well as the access of water through the hatches, were of course remedied as well as possible while under water.

NUMBER OF WORDS IN USE.—Prof. Max Müller quotes the statement of a clergyman that some of the laborers in his parish had not 300 words in their vocabulary. A well-educated person seldom uses more than about 3,000 or 4,000 words in actual conversation. Accurate thinkers and close reasoners, who select with great nicety the words that exactly fit their meaning, employ a much larger stock, and eloquent speakers may rise to a command of 10,000. Shakespeare, who displayed a greater variety of expression than probably any other writer in any language, produced all his plays with about 15,000 words. Milton's works are built up with 8,000, and the Old Testament says all that it has to say with 5,642 different words.

COMPOSITION OF COIN.—The gold coin of the United States is formed of gold, ninety parts, silver, two and a half, copper, seven and a half. The silver coin is composed of silver, ninety and copper ten parts. A new alloy which promises to be useful for small coin is just announced by M. M. de Ruolz and de Fontenay of Paris, and is called by them *Tiers-argent* or trisilver. It is composed of 33 per cent silver, 25 to 30 per cent of nickel, and 37 to 52 per cent of copper. The three metals when melted form a compound which is not homogeneous, and it is only by a secret process that a malleable metal is produced. In color the alloy resembles platinum, it takes a high polish and is not affected by exposure to the atmosphere, or by any but the most powerful reagents, and is extremely hard and tenacious.

HIGH PRESSURE.—A turbine water wheel is about to be placed in position for a slate quarry in Wales, with a fall of 1,000 feet. This is believed to be greatest hight of fall ever made use of for motive power; the nearest approach to it being in the Black Forest in Germany, where a turbine works under a fall of 800 feet. The rapid destruction of the step at the foot of the main shaft under the great pressure resting on it, has caused much difficulty in the latter case, which it is proposed to avoid in the Welsh wheel by giving (roller?) bearings to the horizontal part, so as to divide the load over a large surface.

EXPORT OF PETROLEUM,—The United States exported 67,430,451 gallons of petroleum in 1866. The total export in five years has been 168,247,487 gallons. No less than 243 vessels cleared full cargoes of petroleum from the port of Philadelphia in 1866.

THE ground stoppers of caustic alkali bottles incrustate very rapidly; grease stops it but imperfectly, and introduces fatty bodies in the lye. Paraffine is the best agent, because lye is without action on it, and lubricates the surfaces in contact.

THE question of Government administration of telegraphs, as a branch of the postal service, is now agitated in England as well as in this country. Our readers are aware that it has long been in operation in Switzerland.

THE ENGLISH COLLIERY EXPLOSIONS.—The investigations into the cause of the recent colliery explosions in England are still proceeding, and the evidence already taken shows that the mine at Barnsley had been for many months in an unhealthy condition, and that the accumulation of gas in the workings had rendered it so much like a powder magazine that the torch was only wanting to cause an explosion. It also appears that the miners had been in the habit of smoking at their work, and numbers of duplicate keys have been found on the scene of disaster, which the miners had evidently obtained and kept for the purpose of unlocking their safety lamps. Nobody has been found censurable for this state of affairs, however. The subscriptions for the benefit of the families of the miners who were killed already amounted to $250,000.

NEW WATER PROPELLER.– Mr. James Parker describes in *Engineering* for Jan. 11th, an apparatus for propelling vessels by steam without an engine. The steam is issued in extremely small jets, each shooting into the center of an open pipe a quarter of an inch in diameter, conducting into a hot water chamber, into which the jet carries with it a current of compressed air. This compressed and heated air is admitted upon the surface of the water in closed tanks, by the ordinary slide valve, and its force is employed to eject the water through propelling pipes on the plan of the *Waterwitch*, described in the SCIENTIFIC AMERICAN not long since. The steam and compressed air may also be driven into a dry hot receiver and thence used in a large-cylinder engine. The contrivance is a modification of the caloric or hot-air engine.

RECENT COURSE OF POPULATION.—Six of the states have taken an intermediate census, from which the following results are derived by the *Public Ledger*:—

	1860.	1865.	
New York	3,880,735	3,827,818	Loss, 1 3 per cent.
New Jersey	672,035	773,700	Gain, 15 "
Illinois	1,711,951	2,123,606	" 24 "
Minnesota	173,885	250,099	" 44 "
Kansas	107,206	140,179	" 31 "
Alabama	964,201	945,244	Loss, 2 "
Oregon	52,465	65,090	Gain, 24 "

It is well not to lay much stress on census reports in this country, where such things are often done with a looseness which is worse than not attempting them at all. The recent New York census was a broad farce on its face, so far as this crammed and running-over city is concerned; and the general conclusion, that the state has lost population in the last five years, we venture to believe can scarcely be sustained by common-sense testimony from a single township.

A GOOD EXAMPLE.—The directors of the North Eastern Railway (English) have made an arrangement for the instruction of the apprentices in their locomotive department, at the York School of Arts, at a reduced rate, half of which is borne by the Company. To educate their own engineers and machinists scientifically and practically from boyhood, is a shrewd liberality for corporations whose interests depend so much on the capacity and fidelity of such employees. There are many concerns in this country that might improve and economize their service materially by such means.

WHEELING ROLLING MILLS.—All the rolling mills of Wheeling have stopped work. In consequence over one thousand persons are thrown out of employment. This has been caused by the closing of navigation on the rivers, and partly by the decrease in the demand for nails. It is estimated that there are over fifty thousand kegs of nails now stored in Wheeling warerooms waiting shipment. Monday, February 4th, was fixed upon for the resumption of business.

ECONOMY IN FUEL might be greatly promoted, if consumers would imitate the practice of a good fireman with a steam boiler, in sprinkling over the surface of the fire a thin layer only of coals, as often as required. By this method the gases from the fresh coal are not roasted out in such great volume that nearly all go off unconsumed, as the case is when a large mass of fresh coal is roasted at once.

ATLANTIC TELEGRAPH.—The receipts from the working of the ocean telegraph up to the present time have averaged almost $4,100 a day, including Sundays and forty days when the land lines were down. Since the reduction in tariff since Nov. 1st, of fifty per cent, the receipts have been at the rate of $1,400,000 per year.

OIL IN AUSTRALIA.—The popular rendition of the story which accounts for the discovery of glass has been matched in Australia. Late accounts state that some miners lighting a fire at Campbell's Creek found their stone fireplace blazing up. On examination the rocks were found to contain a large percentage of coal oil.

TO RENDER NITRO-GLYCERIN INEXPLOSIVE, says the *Mountain Messenger* (Cal.), a certain admixture of wood naphtha has been found effectual. When it is wanted for use, the requisite quantity can be taken out, and a little water added, which will mix with the naphtha leaving the pure nitro-glycerin at the bottom.

A FORCE of traction of 100 lbs. is sufficient to draw a load of 24¼ tuns at the rate of 2½ miles an hour on a canal. The same force would draw, however, only 1900 lbs. at a speed of 13½ miles an hour. At the latter speed a given force could draw little if any more than on an ordinary turnpike road.

A RAILWAY carriage, moving with a friction of 6 lbs. per tun, would, if set in motion at the top of a straight plane falling 100 feet, and connecting at the bottom with a straight level line, run a little more than seven miles by its gravity alone.

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Improved Corn Planter.

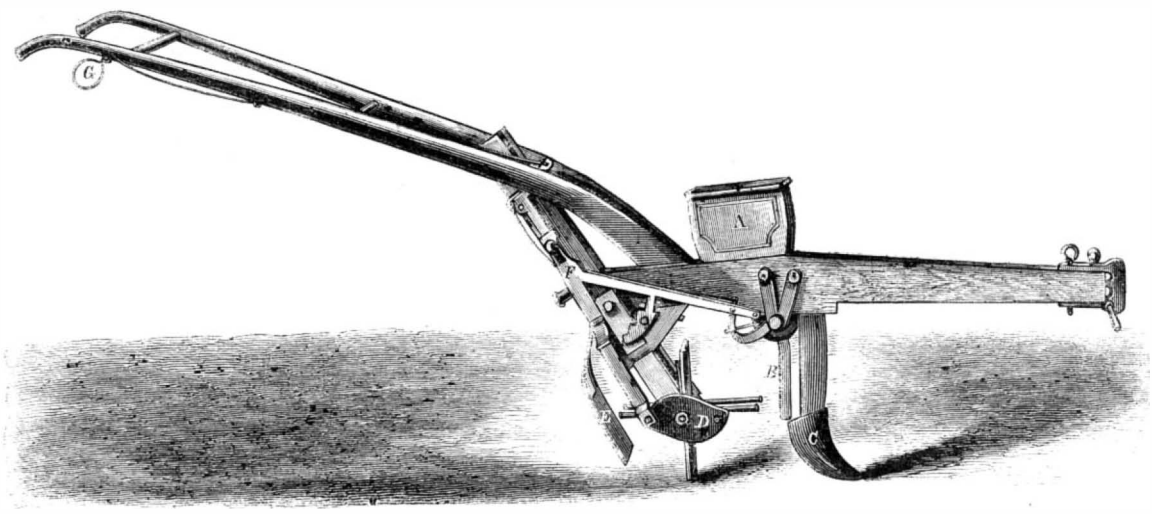
The engraving represents a one-horse, one-row corn planter, intended for dropping and covering corn or other seed in hills and leaving an easily distinguishable mound for each hill. The frame—beam, handle, etc.—is made in the usual form, A being a hopper for containing the corn. Under this is a roller having two cavities in its periphery, one always in contact with the interior of the hopper and the other with the delivery spout, B. The share, C, is to score or trench the soil. A suitable frame projects downward from the rear of the beam and carries a shaft having scrapers upon it and a cam, D, attached. Behind all is the coverer, E.

The corn being placed in the hopper, a portion of it falls into that recess in the roller presented to the under side of the receptacle. The revolution, or rather the half revolution of the roller, to secure the dropping of the seed, is effected by means of a forked lever, F, one arm of which is attached to an arm on the roller shaft and when receded allows a spring—not shown—to rotate the roller. The other fork of the lever engages with pins on the ends of the cam to hold the cam shaft and the scrapers steady, while the face of the cam when in operation actuates the lever.

The ground being marked off one way, the machine is run across the drills and at each intersection the operator holding the handles raises the forked lever by the wire and loop, G, which allows the roller to rotate and deliver the seed and the scrapers also to perform a half revolution. The earth that has been heaped up by the scrapers is then deposited by the coverer, E, on the corn. One or the other of the scrapers is always operating on the soil except at the moment of rotation, when it leaves the heap thus accumulated for the action of the coverer.

A two-horse, double-row machine is made on the same principle, the operation of dropping in this case being performed by the foot of the driver. For newly cleared land unencumbered with stumps and for rocky soils the one-horse planter seen in the engraving appears to be well adapted.

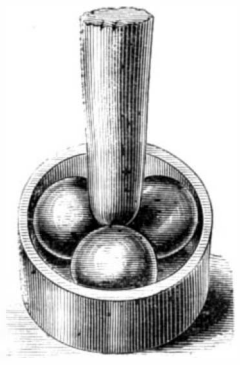
Letters patent were secured for this implement through the Scientific American Patent Agency, Nov. 20, 1866, by J. D. Field, of Keokuk, Iowa, who desires to dispose of the entire right or to sell territory. Address Box 134.



THE FIELD CORN PLANTER.

HAMAKER'S PATENT STEP FOR UPRIGHT SHAFTS.

It is a well known fact that more trouble is caused by the wearing, friction, and heating of the steps than in any other distinctive feature of upright spindles. Vertical shafts sometimes sustain immense weights, and as the weight is confined principally to a very limited area the consequent friction upon the point is enormous. Various materials for steps are used, both of metals and woods, but the plan shown in the accompanying engraving seems to possess advantages over every style of fixed step, at least in the reduction of friction.



No letters of reference are required to assist in the explanation. The balls are of cast chilled iron, placed in a pan shaped vessel, and revolving by means of the rotation of the spindle end, which is made of such a form that its surface engages with the balls at an angle of forty-five degrees and presses them against the rim of the receiver. The difference between the diameter of the inside of the rim, against which the balls act, and the circle which their inner surfaces traverse, is such that their constant and uniform rotation is assured and their wear must be perfectly even. The device can be used equally well in an inverted position. The receiver can be secured to the lower end of the shaft and the balls supported on a point like that in the engraving. In fact, an inversion of the engraving will show this method of applying the device. For situations where dirt would be apt to accumulate with the step in an upright position this method will be found effectual, as no oil or other lubricator is necessary.

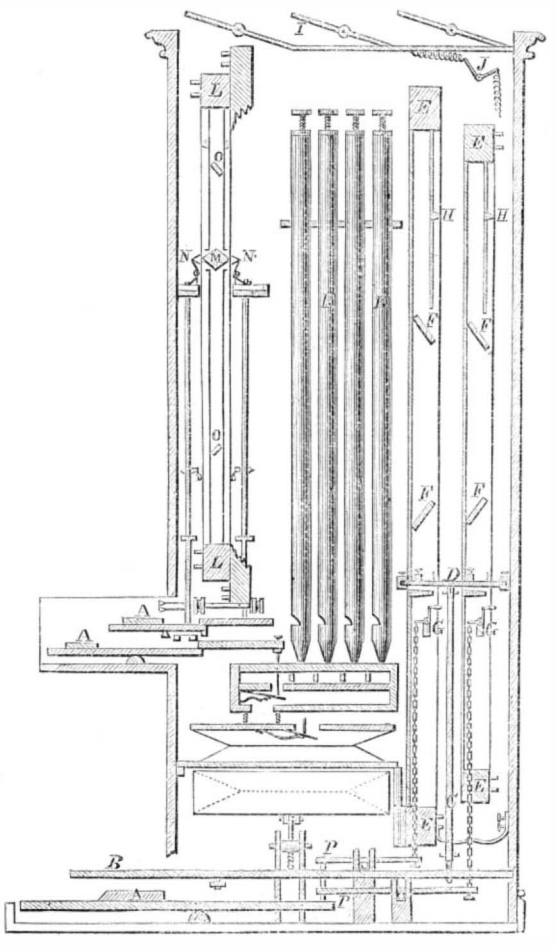
Letters Patent were granted for the device Nov. 13, 1866, to A. G. Hamaker of Eberly's Mills, Pa., from whom persons interested can obtain any other additional information.

A New Substance.

M. Nikles, Professor of Chemistry at Nancy, recently announced to the Academy of Sciences that he had succeeded in obtaining perchloride of lead, a curious substance derived from the only compound of lead and chlorine, and which now must be called protochloride. The latter is obtained directly by subjecting lead to the influence of chlorine by the application of heat, or else by treating litharge with hydrochloric acid. It crystallises in needles, is volatile, and cannot be decomposed by heat. M. Nikles has obtained the new compound by exposing the protochloride to the action of a current of chlorine in a solution of chloride of lime. The perchloride thus obtained is a yellow liquid emitting a strong smell of chlorine, and is a powerful agent for communicating that element to other substances. It will dissolve gold, and produces with aniline and the analagous compounds, those beautiful colors for which those substances are so remarkable. With morphine, it yields a color similar to that of the horizon at sunrise; and with brucine, a rich cherry red. Now, brucine and strychnine, both vegetable bases extracted from nux vomica, are very difficult to distinguish from each other, and here perchloride of lead steps in as a useful agent; for it so happens that it does not produce red with strichnine as it does with brucine, and may therefore be used to distinguish one substance from the other. It serves the same purpose with regard to morphine and the other alkaloids of opium; it will likewise detect bi-carbonate of lime in potable water by producing a yellow tint, and help to distinguish salts of lead from those of bismuth, since it precipitates the former from their solutions and not the latter. It will carbonize cane-sugar and not glucose, and blacken aniline without producing any effect either on fecula, starch, or dextrine. Like other perchlorides, it combines with ether to form a very caustic compound, which attacks both gold and platinum, beside other metals.

DAVIS' IMPROVEMENT IN ORGANS.

The profession of music in this country has within twenty years attained to great importance, and while much attention has been devoted to musical education, no less has been paid to the improvement and perfection of musical instruments. The piano-forte is really the favorite household instrument in all this country; but within a few years the substitution of wind organs adapted to small rooms has been considerably encouraged on account of their adaptabilty to sacred and other music of a slow movement. Long-sustained notes are impossible on the ordinary piano-forte, as after a string has been struck the vibrations which produce the sounds gradually become shorter and shorter and soon cease.



Still, the deep sounds producing the bass tones on the organ are not so sweet and agreeable to the ear as those produced by the vibration of strings; and the object of the improvement herein illustrated is to remedy this defect. Instead of pipes for the bass there are, in this instrument, vertical strings operated by bows in the manner of the ordinary bass viol. By means of the sectional engraving, we will endeavor to make the device understood by professionals.

A are keys, B, the treadle for working the bellows, and the bell crank, C, which works the bows D, across strings, which are tightened to the frames, E. F are octave stops for the strings. G are bell cranks which bring the strings in contact with the bridges, H, and the bows, D, at the same time to produce the different tones required. I, at the top of the instrument is a swell stop operated by the bell crank, J, and springs. The pipes, K, have a screw plug at the top of each for tuning them.

On the front of the instrument, L, are sections of the piano frame and M is a suspension aud division bridge which divides the tone into octaves or unisons by passing the strings over or under it by means of hitch-pins or holes. N are hammers striking the strings on both sides the bridge, and O are cushions to stop the vibration of the sound boards. P are couplers to enable the performer to play upon one or more sets of strings at once.

The performer can command all the stops, pedal-bass, bows, and bellows, alone; but if help is needed the bellows can be worked by an assistant at the side on an independent treadle. The pipes used being small do not require much wind, as the bass and double bass notes are obtained from the viol strings.

These improvements are the result of over seven years' experiments, and are the subject of patents issued in 1863 and 1864 to William Davis, Professor of Music, Tamaqua, Pa. Those interested will address as above.

THE SUSPENDERS BRIDGE.

The *Brooklyn Daily Union* signalizes its enlargement by spreading upon one of its broad pages a monster engraving to represent a fashion of bridge by which a company just formed propose to connect New York and Brooklyn. The peculiarity of the plan consists in adopting four termini, two on each shore, making four corners of a parallelogram, connected by suspension arches thrown diagonally between the opposite instead of the adjacent corners. These diagonals of course cross each other midway like a pair of suspenders, and give the passenger from either starting point a choice of two landing places on the farther shore, thus making in a certain sense four bridges in one. Each span will be some 2,000 feet in length, and will necessitate what appears not to be contemplated, a center pier at least, at the point of intersection. Even with that modification, the sections will be of decidedly unadvisable length. It is not doubtful that bridges can be built and used of 1,000 or even 2,000 feet span; but it should always be remembered in forming plans, that every foot added to the length of span diminishes the length of life, in a bridge, on account of the increased vibration. It has been stated as the result of certain experiments, that an iron girder will break with about 400,000 changes of load with accompanying vibrations. Probably this is not to be considered a rule, for a rule is hardly possible: but it is evident that the wearing out in this way of every iron bridge is but a question of time, that the best economy is to give such bridges the rigidity of short sections as far as circumstances will permit, and that the construction of bridges of immoderate span for very heavy traffic would be highly imprudent.

The "suspenders" plan would be in some respects an advantageous arrangement for two bridges, if two were to be built; but it will cost more and not less than two parallel bridges, unless it is built on a very inadequate scale, and will not serve nearly so good a purpose as two parallel bridges with termini further apart. One bridge at a time will be on the whole the best policy.

Process to Recognize Bleached Whale Oil from Unbleached Oil.

Making experiments on the bleaching of fish oils. I was struck by the action of concentrated sulphuric acid on raw and bleached oils. This action caused me to try if I could not furnish a regular and safe test for the manufacturer, so that he could detect in a few minutes the quality of the oil to be used.

Take a watch glass, pour into it a little unbleached oil, and with a glass rod take one drop of sulphuric acid and mix it with the oil; immediately the oil colors a dark brown. The same experiment repeated with bleached oil, the mixture remains limpid, and colors very slowly; and it requires ten minutes before it is a dark brown.

The oil can only be bleached by an alkali without being deprived of its albuminous matter. To see the difference, take three watch glasses; in one pour a little raw oil; in the second some bleached oil, not deprived of albumen; and in the third some perfectly pure oil. In each one pour one drop of concentrated solution of tannin. In the first it produces an abundant precipitation, and you can see some brown particles swimming in the liquid. The result is the same with the second; and in the third it produces a white magna, which disappears in letting it settle.—*Journal of Applied Chemistry.*

The Cashmere or more properly the Angora goat, is being largely introduced in the West. There are now about one thousand in Illinois, as many more in Ohio, and several thousand in Kentucky.

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THE COTTON MANUFACTURE---MULE SPINNING.

[Notwithstanding the enlargement of the paper at the commencement of this volume, we find ourselves pressed for room. For this reason our articles on the cotton manufacture have been unavoidably interrupted for two weeks, there not being room for them without doing injustice to our contributors. We hope to finish the series without further interruption.]

When the cotton has left the speeders in the form of roving it enters upon a new stage in its progress. It is to be changed from the soft, almost impalpable filament to a hard twisted, rigid yarn fit for weaving into cloth. For this purpose it must be spun, an operation which is performed either on "mules" or spinning frames. The "mule" is a machine differing from the old spinning wheel and its operator mainly in being larger and much improved. In the use of the old spinning wheel—and it has not been so long obsolete but that some of our readers are familiar with it—the spinner, grasping the "roll" at the end of the spindle, recedes gradually, drawing out between the finger and thumb the attenuating thread to a stretch as far as the hands can reach, and then reversing the motion of the wheel, winds up the spun and twisted thread on the spindle to begin anew. This is precisely the action of the "mule" whether hand or self-operating. Instead, however, of the operator managing a single thread he controls a thousand. A brief description will make this clear. The mule is a long carriage like a box, two feet high as many wide and perhaps forty, or fifty, or a hundred feet long, running on wheels which traverse iron tracks, the box carrying on its front side a row of spindles projecting above the box and inclined at an angle of about twenty degrees toward the source of supply of the roving. Inside the box are drums nearly upright but inclined on their axes to the same direction which the spindles have. These by bands of twine give motion to the spindles while the drums are driven by suitable belts attached to the machinery at the "head" of the mule, which may be either in the center of the length or at one end.

There are two of these long, box carriages, one running in while the other is running out. Behind each are frames called "creels" which contain the speeder bobbins of roving arranged in double or triple tiers and rotating vertically on their spindles by the draft on the roving itself. These rovings are fed through guides to rollers similar to those on the drawing frames and speeders described in preceding articles. The lower series are of steel fluted very finely and the upper ones of iron covered very smoothly with soft leather, sheepskin being preferred. The roving passes between these rollers and comes out at the front in a filament of cotton so fine and thin as almost to approach invisibility. This film when spun is yarn. Instead, however, as in the drawing frames and speeders, the cotton being entirely drawn to a finer film by its passage between the rollers, it is pulled or stretched out while being spun by the retrogression of the carriage which contains the spindles and traverses the transverse rails laid for its wheels. The yarn on the spindles is attached to the film of cotton as it appears from between the rolleres, and the speed of the spindles soon twists it into a hard thread, drawing it out evenly as the carriage with its spindles regularly and steadily recedes from the rollers.

It will be seen that in all respects this operation is that of the old-fashioned spinning wheel and spinner. The rollers on the mule which detain and gradually pull out the material correspond to the finger and thumb of the old-style spinner, and the forward and backward movement of the mule carriages to her lithe stepping back and forth. The winding up of the spun product is also the same.

When the mule carriage has run back from the rolls and spun the length of yarn—ten or twelve feet—the motion of the spindles stops with that of the carriage. It is then reversed sufficiently to unwind that portion of the yarn which is twisted spirally about the spindle to the top, when a wire guide called a "follower" depresses the yarn, and, as the carriage runs in, winds up the spinning in a cone-like form making what is called a "cop." It might be supposed that the yarn, while being spun as the mule recedes from the rollers, would wind around the spindles and break, but the inclination of the spindles, the elevation of the rollers above their tops, and their pointed form, prevent this. They merely twist the yarn.

The "mule" was formerly run in by a man called a mule spinner, who when the carriage had come out managed with one hand a large band wheel and with the other the "follower," running the carriage in and forming the "cop." The self-operating mule is the kind now used. In this the services of the spinner are dispensed with, only "piecers" and "roving boys" or "bobbin boys" being employed. The duty of the latter is to keep up the supply of roving in the "creels" by replacing full bobbins for empty ones. That of the "piecer" involves considerable skill and long practice. If an end breaks he stops the spindle by pressing on its side with the thumb, disengages the broken thread, and holding the end between the thumb and forefinger over the nail of the middle finger, he dexterously fillips the yarn on the roving as it comes through the rollers and the twist secures immediate union of the parts.

When the spindles are full the mules are stopped, the "cops" partially raised on the spindles, and a length of yarn is run on the space below the "cop" for a new start, and then the cops are taken off and packed carefully in boxes for the weaver. A description of the spinning frames and subsequent operations must be reserved for another article.

A LOUISVILLE skater named Ronalds has no legs. He uses three skates, sitting upon one and putting the others on his hands. A Russian in Chicago skates on stilts.

DANGERS OF KEROSENE LAMPS, AND MEANS OF SAFETY.

The safer hydrocarbon oils—such as have been tested for inflammable vapor at 100° Fah., for instance—are proved to be unsafe in all lamps with the ordinary metallic wick tube and cap, exposing a heated surface to the accumulated gas within the vacant area above the oil. The apparently unaccountable explosions that sometimes take place are explained by the simple fact that the brass work in contact with the spontaneous exhalations of the oil is usually at a temperature of 108° to 110°, when the lamp is in use. That this actually renders the gas explosive (with the proper proportion of air) appears to have been proved by the experiments of Dr. John Attfield, F.C.S., reported in *The Grocer*. A lamp had exploded at the house of a country gentleman, and the fragments, with the can of oil from which the lamp had been filled, were sent to Dr. Attfield for the purpose of elucidating the cause of the explosion. The oil yielded no inflammable vapor under 83° Fah. The brass work was fitted to a reservoir similar to that which had been broken, and after burning the lamp for five hours, the temperature of the oil being only 65°, but that of the brass work around the wick being as high as 108°, it was found that a mixture of heated gas and air had been formed within the lamp, which exploded on the application of a light.

From this experiment and these reasons, there seems no room to doubt that in general all "kerosene lamps," when burning, contain the dangerous element which has wrought such melancholy havoc, in full potency, waiting only the accidental application of flame, or the coincidence of such accident with the proper admixture of air, to burst and spread destruction around. If there is any lamp in the market which guards against this danger from the heated brass work, we are not aware of it. We have procured a number of patents for guarding the brass work from contact with the aëriform contents, and for substituting less conductive substances for metal in burners and caps, but none of them have seemed to make their way into the general lamp trade. It may be hoped that Dr. Attfield's demonstration may be the means of bringing out these valuable improvements into notice.

But there is a partial reassurance for those who will burn only highly refined and carefully tested oils, in the fact that Dr. Attfield found no explosive mixture in a lamp which had been burned for seven hours with an oil yielding no inflammable vapor below 114°. The lowest test for ordinary safety is above 110°, as the brass work may be expected to heat to that point: while it is liable of course to be heated still higher, according to the intensity of combustion, the character of the metal, and the warmth of the sur rounding atmosphere; so that there is no absolute safety attainable while the heated metal is exposed to the interior of the lamp.

The importance of domestic tests for common use is brought into stronger light than ever by these developments. It is imprudent to rely implicitly on dealers in oils, whatever their standing. A dealer who made it a rule never to sell an oil which he had not himself proved for inflammable vapor at 115°, would be glad to have every purchaser re-test his oil at home. It would make his light shine, expose the difference between cheap and good oil, and serve directly and indirectly to prevent calamity.

The proper test, for all who can procure a chemist's test tube, say 6 inches long and an inch or more in diameter, and a naked thermometer, is to place a little of the oil in the tube and heat it gradually, stirring it frequently with the bulb of the thermometer, and at every degree of ascending temperature introducing a small flame into the open end of the tube, until the vapor ignites. The degree at which this takes place indicates the temperature at which this oil or its vapor, and by consequence the brass work exposed thereto, will be dangerous. It would make a good article of commerce to put up these two requisites—the test tube and naked thermometer—with directions for their use, at the lowest profitable price, and advertise them throughout the country.

A cruder experiment, which many will not like to try, but which Dr. Attfield assures us is as harmless as that of lighting raisins in brandy in the Christmas game of snap dragon, is to unscrew the cap after the lamp has burned an hour or two and quickly apply a match within the reservoir. A light-blue flash of flame and a puff-like explosion will be perceived, if the lamp is in a dangerous condition. When the lamp is open, this can do no harm: but when confined, the gas if ignited must find a vent by bursting the lamp and scattering the oil in every direction.

SPONTANEOUS COMBUSTION OF "COFFEE."

BY PROFESSOR CHARLES A. SEELY.

An ex-coffee manufacturer has given me the particulars of two interesting cases of spontaneous combustion which occurred in the course of his business; and as it seemed to me that the facts might prove useful if widely known I obtained his consent for their publication. For the information of a small number of my readers it is necessary to explain that a coffee manufacturer is one who roasts beans, peas, wheat, barley, rye, corn, chicory, etc., grinds with a few roasted coffee-berries, and divides the mixture in neat paper parcels to suit the demand of the public. Many consider this business illegitimate. I do not, unless the product is represented to be what it is not. The public will have what they call for.

My friend in various ways had observed a tendency towards spontaneous combustion of some of his roasted material, and had adopted what he supposed sufficient precaution against dangers. One day he roasted about ten bushels of barley As was then his practice, the grain was drawn from the roaster on a large cooling table covered with zinc, spread out and turned over until it was supposed to be cold. It was then, late in the day, put into barrels, and shortly the factory was locked up for the night. During the night a watchman discovered smoke issuing from the premises, made a forcible entry, and found the barley in all the barrels on fire. The barrels were promptly rolled into the street and the fire was extinguished by an abundance of water.

After this he adopted further precautions, but failed again. As soon as the roasted grain was spread out it was sprinkled with water from a watering pot, and was left a longer time on the table. A few bushels of roasted wheat were spread on the table, sprinkled with water and left on the table for the night. In the morning in place of his wheat, he found only a heap of clean ashes. There was not a kernel left unconsumed.

In explanation of these cases I would suggest that during the roasting there is generated a substance which has a peculiar affinity for oxygen and in this respect is akin to linseed oil. This substance is probably a volatile oil to which the peculiar aroma of roasted grain is due. Such a substance is known to exist in roasted coffee-berries. The aroma of coffee is soon lost by reason of its affinity for oxygen which changes it into a substance which has little or no odor. Hence also dried coffee grounds are not near so combustible as fresh roasted coffee.

Science Familiarly Illustrated.

What is Steel and How Made?

Steel is a variety of iron occupying a position between wrought iron and cast iron, having less of carbon than cast iron and more than wrought iron. Pure malleable, or wrought iron, is theoretically considered as containing no carbon, but probably few specimens exist without containing some. Cast iron has four or five per cent and steel only from one-half to one and a half per cent. As the proportion of carbon in steel increases so it becomes hard and brittle and increases in fusibility as cast iron; but with diminishing proportions of carbon it assumes more and more of the softness, malleability, and toughness of wrought iron. Steels of the former character are called "high" steels, and of the other "low" or "mild" steels. Steel is made in Germany direct from pig iron which contains four or five per cent of carbon. By furnace manipulation a portion of this carbon is driven out and the product is German steel. This is not a pure steel and is generally incapable of being hardened and tempered.

The usual method of producing steel is by cementation or conversion, bars of wrought iron being used. A furnace of suitable form contains boxes made of fire brick in which the bars of iron are packed in layers covered with charcoal powder. The bars do not touch each other but each is enveloped with the charcoal. When filled the pots are covered and cemented air-tight. Heat is then applied by a proper furnace and grates and the fire gradually increased in intensity for several days. A test bar is introduced at the beginning and is occasionally withdrawn to determine the progress of the process. When the process is completed the bars, if broken, will be found to have changed their fibrous for a crystalline structure. The surface of the bars is covered with thin blisters as though laminæ of the iron had been raised by the expansion of a gas under them, and from this it gets the name of blistered steel. For some purposes this steel is useful, but it is unfit to be worked into tools for cutting wood or metals.

The next process is the tilting. The bars are cut into convenient lengths, piled together and heated in a furnace to a weld and placed under a trip hammer which welds the pieces together and draws them out into a bar. This process improves the quality of the steel and fits it for some purposes; but there is another method of treating the blistered steel; that is to melt the steel in air-tight crucibles and cast it. The ingots are then re-heated and hammered and perhaps rolled. This process of hammering and rolling is a very important one. In fact, after the conclusion of the manufacture in the working of steel bars, to form them into tools, good forgers always expect to refine and improve the steel by judicious heating and hammering.

What makes the great difference between steel and wrought or cast iron is still a puzzle to mechanics and scientific men. The main difference appears to be in the varying proportions of carbon which each contains, and in the different chemical conditions in which it exists, yet the amount in those specimens which contain the most is so small that it is difficult to account for its so entirely changing the character of the metal. It is not yet fully settled that the iron and carbon is chemically united in the best of steel, while it is certain that it is not so united in cast iron but that the union is a merely mechanical one. There is much yet to be learned about iron and steel before we arrive at the real facts.

The Care of Belts.

The apprentice sometimes finds considerable difficulty in the management of belts on machinery. Experience will in time teach him, but in this, as in many other cases, experience is a costly teacher, and much can be learned by instruction. A belt to run well should be perfectly straight, with parallel edges, and of equal thickness throughout its length. The time is past when every mechanic manufactured his own belts from the side of leather. They can be bought so much superior, of belt manufacturers who make that their business, that they are cheaper than the home manufactured. No belt should have more than one butt joint. If it is advisable to put together pieces of old belts to form one, the joints should be scarfed and lapped. Old belts have usually absorbed so much oil that the ordinary belt cement—fish glue—will not unite their surfaces; then riveting or sewing should be resorted to. In riveting the heads should be on the wearing side and the washers on the outer surface. In sewing, the awl

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should pierce the leather in a slanting direction, and the lacing put through so as to present but a small amount of its surface on the pulley side. In making a butt joint the lacing should not be crossed on the wearing side, only on the outer side. The too frequent use of the belt awl is reprehensible. In making a lap joint, however, the awl alone should be used, and the perforations should be as small as possible; but in a butt joint avoid as much as you can the use of the awl and have recourse to the punch. This cuts a clean hole, much less liable to tear than the puncture of the awl. Care must be taken in unlacing a belt by pulling the lacing out with the awl. The eye-sight has been destroyed by plunging the awl into the eye. If a belt is to be "taken up," *i. e.*, shortened, the cut should be made perfectly straight across, and for this a try-square should be used. If not cut straight and the butts be brought together and sewed the belt will be crooked, and after running awhile will become permanently curved. It is important that belts should be kept clean, especially on their under surfaces, and that no accumulations of gurry should be allowed on the pulley face. If belts are neglected in this particular they are certain to become stretched and crooked. Too much oil—the lubricating oil for machinery—rots the leather and destroys the belts. Whenever they become hard they should be moistened with good neat's foot oil.

Debate on the Extension of a Patent.

In the House of Representatives on Friday, a bill came up to authorize the Commissioner of Patents to hear the application of the heirs of Thomas W. Harvey for the re-extension of the patents of May 30, 1846, and August 18, 1846, for improvements in machinery for cutting screws and dressing screw heads, and to grant extension of such patents for seven years, from May 30, 1867, and August 18, 1867.

Mr. Bromwell (Rep.), of Ill., who reported the bill from the Committee on Patents, addressed the House in support of the bill.

The bill was opposed by Messrs. Hall, Washburn, of Mass., Allison, Stevens, and Morrill.

Mr. Hale (Rep,), of N. Y., represented that although the patentee or his heirs may not have derived much advantage from the invention, the assignees of the patents had made immense fortunes. He described it as the most enormous and gigantic monopoly that this country had ever seen.

Mr. Washburn (Rep.), of Mass., took the same ground, and showed that the public had already paid millions for the invention. He also showed that the widow and heirs of Harvey, had assigned their interest to the American Screw Company, of Providence, R. I.

Mr. Allison (Rep.), of Iowa, stated that the American Screw Company, which had the patent, had actually bought off an English screw company from bringing their productions into the American market, paying it a royalty of $40,000 a year.

Mr. Stevens (Rep.), of Pa., stated that for years past the American Screw Company had divided thirty to forty per cent semi-annually.

Mr. Morrill (Rep.), of Vt., added that the stock of the company was two or three hundred per cent over par, and that its dividends were immense.

Mr. Bromwell denied that the bill was for the benefit of the American Screw Company, asserting that it was for the widow and heirs.

Mr. Myers (Rep.), of Pa., a member of the Committee on Patents, spoke in support of the bill.

Mr. Allison moved to lay the bill on the table.

Mr. Washburn, of Mass., demanded the yeas and nays on the motion.

The motion was negatived—yeas 70, nays 75.

The morning hour expired, and the bill went over till the next day, when it was tabled by a large majority.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Stoves vs. Grates.

Messrs. Editors:—A controversy has been going on for some years between the advocates of stoves and those who prefer the *luminous* heat projected from an open fire, and one controversalist (page 42, Scientific American, current volume), rather summarily disposes of the numerous and intelligent advocates of the grate as "old fogies or musty and misinformed sanitarians whose theories are inspired by their own infirmities."

Were man a pie or a potato, the question might be dismissed at once in favor of the stove, as the more efficient instrumentality of mere heat: but that stoves and other tight heaters are more cleanly than the grate many housekeepers deny, averring that a properly arranged ash flue will carry off nearly all the dust incident to stirring, while that entering or forming in the room itself escapes over the fire instead of accumulating on that portion of the wall and ceiling which, in the case of close heaters, receives the impact of the ascending currents.

Grates are said to be more dangerous on account of fire, but an underwriter whose experience is second to none, states that no discrimination is made in the estimate of risks, and that if any were made, it would not be in favor of stoves.

The stove partisans cite the well-known statistics of actual conversion of oxygen by a pair of human lungs and by a given quantity of fuel respectively, and the large overplus supplied by the present perfected (?) plans for warming, whereupon the adherents of the grate are expected to reconsider their headaches and be convinced.

The advocates on both sides, being equally sincere and intelligent, is there not a reasonable inference that the delicate human organism is subject to some subtle influences not yet wholly accounted for? This admitted, there remains one test, more conclusive than any argument.

The public schoolroom—packed with individuals in rapid development—is the place where questions of warming and ventilation assume the most vital importance, and if, as some assert, thousands of children are yearly immolated by ignorance on this subject and a misdirected economy, there should be no delay in the initiation of impartial and exhaustive experiments. The most salutary arrangement might be found in a combination of the two systems, having discretionary use of warm-air registers or of floor-warming devices, as auxiliary to the fireplace in very cold weather and for the maintenance of an equable temperature in halls and passages. Several establishments should be selected, as nearly as possible equal in salubrity, capacity and numbers, and a careful record be kept in each of the cost of fuel *per child*, extreme and mean temperatures, hygrometrical and electrical conditions, intellectual progress, general health and spirits, sickness and mortality. For such an investigation, mere opinion could afford to wait. G. H. K.

Cincinnati, Jan. 21, 1867.

[An arrangement for obtaining the advantages of the open fire without its distressing drafts and dustiness, is to lay the firegrate flat in the hearth, on a level with the floor, letting it draw its air from a chamber or chimney beneath communicating with the cellar, and drop all its ashes and cinders into the same receptacle. We understand that this apparatus is made in Philadelphia, and we can easily credit the statement that its operation is very agreeable.—Eds.

The Mathematics of Music.

Messrs. Editors:—Frequent allusion has been made in your journal to the beautiful connection existing between the natural and physical sciences. We have had a glimpse at the link between astronomy and chemistry, in the partial analysis of the sun's substance by means of the spectrum; and at another, between astronomy and her sister sciences, in the discovery of our outermost (?) planet by Leverrier. And the mathematician would tell us that he everywhere discovers the confluence of his favorite science with every other string on the great diapason of nature.

The object of the present paper, however, is to exhibit a link of much humbler pretensions. We allude to the connection between *music* and *mathematics*.

If a string of the harp or piano be struck, it will return to rest by a series of isochronous vibrations whose rapidity will be governed by the length and tension of the string, and the sound emitted will be higher or lower as the vibrations are more or less rapid. Musicians tell us that the voice ascends *naturally* by a series of whole and half intervals. It is the mathematical relation of these intervals which we propose to consider.

If we assume any sound, as C, to be the result of a given number of vibrations in a certain time, the other notes of the staff, ascending, will be as follows:—

C=16 or 384.	G=24 or 576.
D=18 or 432.	A=27 or 648.
E=20¼ or 486.	B=30⅜ or 729.
F=21⅓ or 512.	C′=32 or 786.

The larger numbers are relatively the same as the first, only multiplied up to clear them of fractions. Is it not curious that not one of these larger numbers contains a prime factor greater than 3?

Sounds which bear simple relations to each other, as C : G : : 2 : 3, etc., give harmony, while those bearing more complex relations, as C : A : : 16 : 27, give discord.

If we extend the figures through another octave (marked ′) we will have:—

D′=36. A′=54.

Now 54—36=18, which corresponds to D of the first octave, and this sound may be distinctly heard as a distant complement when the two notes, D and A, are sounded together on the accordeon or the higher keys of the melodeon. The same rule holds good with all the combinations.

We would carry the investigation much further but for encroaching on your valuable pages. J. W. Hollingsworth.

Paoli, Ind., Jan., 1867.

Consumption of Coal.

Messrs. Editors:—A correspondent of your valuable journal, Mr. Vander Weyde, page 22, current volume, refers to the consumption of 4 lbs. of coal per horse-power per hour in steam engines as a "theoretical economical amount," "never reached on a small scale," "some modern improved engines and boilers coming wonderfully close to it."

Ward, in his "Steam for the Million," pages 30 and 83, gives the consumption of coal—*Great Eastern*, said to be 4 lbs. per horse-power per hour; locomotives, 2¼ to 2½; *Wyoming's* engines, 2·73; Cornish engines, 2 lbs.

Bourne in his Catechism gives Cornish engines 1·74 to 3·1 lbs. per horse-power per hour. S. F.

Philadelphia, Jan. 23, 1867.

"The Great Peat Delusion."

Messrs. Editors:—I have read with great interest in your number of February 2d, an article by Prof. Charles A. Seely, entitled as above. After eighteen months' close study of "peat as a fuel," I am led to conclusions so directly in conflict with those (given by inference rather than actual statement) of the learned Professor, that I make bold to reply. There can be no dispute as to the truth of his premises, that the heat-producing power is what we want in fuel. The only trouble is that the statement is not complete. Had the Professor added, "and that fuel which, with this quality, is most free from deleterious admixture, and whose residue has a marketable value, will prove, all things being equal, the cheapest and best;" he would have published a proposition to which no exceptions could have been taken. Neither is the Professor altogether fair in quoting anthracite alone.

Anthracite coal is a most important fuel, but it is only one of many in use in America. New England burns up wood, charcoal; Nova Scotia, Cumberland and cannel coal, as well as anthracite. Illinois uses the soft coals of Ohio as well as her own. The coal that in Pittsburg is sold for two dollars per tun, is worth ten dollars in Boston, and eighteen dollars in Chicago.

The anthracite that fills the cupola of the iron furnace must give place, in the glass houses, to Cumberland, while gas companies find it for their interest to import cannel from England and Pictou from Nova Scotia.

In the generation of steam on locomotives and stationary engines, coal has displaced wood, because the latter fuel has become scarce and dear. The foreman of every railroad repair shop in the country will tell you that, as a result, full ten per cent has been added to the cost for repairs, by the burning of fire boxes and the bursting of flues. How great may be the additional disadvantage from the noxious smoke, and the never-ceasing shower of cinders, let the numberless hosts of suffering passengers answer.

I might pursue these comments further, but prefer to inquire, is peat a "great delusion?"

In answer to this interrogatory, I cannot do better than cite a portion of a letter now before me from Prof. S. W. Johnson, dated Sheffield Scientific School, Yale College, New Haven, Conn., Nov. 27, 1866.

Gentlemen:—I have examined the two samples of peat sent by you as coming from the Great Dismal Swamp. . . .

Calculated with the usual contents of water (twenty per cent) occurring in air-dry peat fuel, we have:—

	Surface peat	At 4 feet depth.
Water	20·00	20·00
Volatile matter	50·05	52·59
Coke (ash free)	24·97	25·44
Ash	4·98	1·97
	100·00	100·00

Both of these samples are of excellent quality. The sample taken from a depth of four feet, especially, is remarkably free from ash, which adapts it for gas making, metallurgical purposes, etc. For iron smelting and working, this peat, properly condensed, would answer admirably.

From a letter of Prof. B. Silliman, of Yale College, dated Jan. 1, 1867, I quote:—

It is evident that this peat (speaking of four samples from the same locality which he had analyzed) has an excellent composition. . . . The water contained in peat may, indeed, be removed wholly by artificial drying; but in practice, a peat containing less than fifteen per cent of water, is found to absorb moisture, and thus regain its original weight. Your plan of compression (by the use of Leavitt's condensing mill), is therefore highly advantageous, not only in removing from it water, and in preventing absorption of water from air, but also in giving compactness and ease of transportation to the manufactured article. In conclusion. . . . . I do not doubt that, by the use of the approved modes of preparation which you are employing, you will be able to place in the market an exceedingly useful and merchantable fuel.

I might go on at length, quoting not only the opinions of scientific men, but also the results of actual practice in some of the largest manufacturing establishments in America. Perhaps however I shall have consumed all your space when I state, that the comparative merits of peat and mineral coal as steam generaters have been so thoroughly tested, as to induce one of the largest railroad corporations of this State, to enter into a contract with the New York Central Peat Company, of which Gen. Henry A. Barnum is President, for one hundred thousand tuns of peat fuel. And as a final proof of its practical value, that at least five of the leading railroads of America are only waiting to be guaranteed an adequate supply before altering the fire boxes of their locomotives, to adapt them to this "delusion." Benj. S. Pardee.

31 Pine street, New York City, Jan. 31, 1867.

An Invention Wanted.

A naval engineer, writing from Pensacola, Fla., says:—"Can any of your contributors propose a method of making a substantial large sized brick, or block, of any compound material, to cement sand and which shall at the same time be cheaper than the present red brick, and as durable and more convenient for building purposes?

"I shall feel quite interested in a reply to this, as in this section brick are scarce and high in price, the material being found in but few places and the clay of an inferior quality, while sand is in abundance."

Another Novelty.—Cigar tubes are now selling in London, which, after being used for a short time, develope a picture previously invisible. Chemical analyses show that these are photographs prepared in the ordinary way, and then made invisible by the aid of bi-chloride of mercury, the same process, in fact, by which the "magic photographs" are prepared. Magic photographs may be made visible by the application of hyposulphite of soda, and in the cigar tubes the heat and ammonia from the tobacco have the same effect. It is probable, therefore, that these tubes were originated by some genius who accidentally discovered the effect of tobacco juice on invisible photographs.

To Mend Broken Glass.—A much better proces for mending broken glass, china and earthen ware with shell-lac than heating them, is to dissolve it in alcohol to about the consistency of glue or molasses and with a thin splinter of wood or pencil brush touch the edges of the broken ware. In a short time it sets without any heating, which is often an inconvenient process. It will stand every contingency but a heat equal to boiling water. L.

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Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SASH STOP AND LOCK.—Wm. H. Truesdale, Elgin, Ill.—This invention consists in a pivoted dog or catch which operates upon the edge of the wooden sash in such manner as to hold the same by friction at any given hight, its end being bevelled in such manner as to have the effect of crowding the sash up against the weather strip in the one side and up close against the jamb at the opposite side of the window whereby a tight joint all around is ensured, for keeping out the cold and rain.

ROTARY STEAM ENGINE.—J. B. Willet and Livingston Brien, Nashville, Tennessee.—The object of this invention is to obtain a constant action of the steam upon the driving shaft of a steam engine.

OIL.—E. K. Wood, and R. W. Henry, Dewitt, Iowa.—This invention relates to an improved oil as a substitute to be used for linseed oil in the mixing of paints.

BUTTON FASTENING, ETC.—G. A. Lingard, N. Y.—This invention relates to a novel attachment to studs, etc., by means of which they can be securely fastened to the clothing.

ATTACHMENT OF HANDLES TO BRUSHES AND OTHER IMPLEMENTS.—Miss Anna Eddowes, Frankfort, Pa.—This invention consists in securing the handle to the head of the brush, in such manner that while a firm and secure fastening is obtained, the handle can be readily detached and attached at pleasure.

SEED PLANTER.—J. Shattuck, Waterloo, N. Y.—This invention relates to a new and improved machine for planting seed either in hills or drills, and it consists in a novel construction and arrangement of parts, whereby seed may be planted at the required depth in the soil, covered, and the earth pressed upon it, all the parts being operated automatically or under the draft movement of the machine.

CULTIVATING AND SEEDING MACHINE.—W. K. Garrison, Abingdon, Ill.—This invention relates to a new and improved cultivator and seeding machine, and it consists in a novel construction and arrangement of a movable or adjustable frame with a lever and main frame or draft pole, whereby the device is placed under the complete control of the operator when used either as a cultivator or seeding machine.

TIPPING ATTACHMENT FOR POTS AND KETTLES.—Charles Coester Jr. and W. L. Deevey, Bridgeport, Conn.—This invention relates to a new and simple attachment to be applied to pots and kettles which are not provided with handles, and is designed to assist in tipping the same.

WASHBOARD.—William A. Jordan, New Orleans, La.—This invention consists in attaching springs to the underside of the washboard, which springs allow the board to yield to the pressure brought to bear upon it in the rubbing of the clothes thus relieving the clothes from wear.

HORSE HAY FORK.—E. B. Woodruff, Morristown, N. J.—This invention relates to a new and improved horse hay fork for elevating and depositing hay in barns, and it consists in a new and improved means, whereby the loaded fork is firmly secured in position, while being elevated and rendered capable of being readily tripped so that it may discharge its load when required.

MEANS FOR PREVENTING ACCIDENTS ON RAILROADS.—Milton Wallwork, Shelbyville, Tenn.—The object of this invention is to obtain a simple and efficient means for preventing accidents on railroads, such as the collision of trains, the running of the same off from drawbridges, etc., etc.

MACHINE FOR CUTTING CANVAS, CARDBOARD, ETC.—H. H. Pember, New York City.—This invention consists of two feed or pressure rollers between which the canvas, etc., to be cut is drawn in combination with a knife blade so arranged that it can be adjusted in position according to the width of strip desired.

MANUFACTURE OF NOZZLES OR SPOUTS OF COFFEE POTS, PITCHERS, ETC.—W. H. Milier, Brandenburg, Ky.—This invention consists in a novel manner of forming the spouts or nozzles to coffee pots whereby it can be done with great quickness, convenience, and efficiency.

HORSE RAKE.—Emandes Krous, West Liberty, Ohio.—This invention consists in constructing a horse rake in such a manner that all of the teeth will conform to all the sinuosities of the ground by attaching them to independent bars that are constructed in such a manner that each one can be raised or lowered without interfering with the others.

DEVICE TO PREVENT HORSES FROM CRIBBING.—Robt. Jennings and Jas. A. Marshall, Bordentown, N. Y.—This invention has for its object a very effective and simple device for preventing horses from indulging in the habit or disease of what is termed cribbing. It consists of two pieces of steel spring of suitable length both made in the form of an arc of a circle one within the other. The outer spring has a shorter or smaller diameter than the inner one. In the outside spring is secured several sharp points that project to near the inside spring. The inside spring is provided with a slot or mortice through which these points project when the inner spring is pressed down.

WATER WHEEL.—A. P. Johnson, Edwards, N. Y.—This invention relates to a new and improved water wheel of that class in which screw or spiral buckets are employed, and it consists of two wheels placed on a horizontal shaft and fitted in the ends of a case which has a draft tube communicating with it The buckets of the wheels are formed with a gaining twist or spiral, that is to say, the pitch of the buckets gradually decreases from their outer to their inner ends, and the wheel case is provided with a tube containing a valve which is automatically opened when the gates are closed to admit of the discharge of the water from the case and draft tube. The invention also consists in a novel construction of the outer ends of the buckets the same being made to serve as cutters to cut drift wood and admit of the same passing through the wheel without stopping or choking it up. The invention further consists in the novel construction and application of gates to the wheel case whereby the gates may be operated, opened and closed with the greatest facility.

EGG AND CREAM BEATER.—F. Oakley, London, England.—This invention relates to a device by which eggs and cream can be beaten with the greatest despatch and ease, and which is easily cleaned and not liable to get out of order.

VALVE MOVEMENT.—C. C. P, Peabody, Calais, Maine.—This invention consists in an arrangement which enables one to operate the valve of a steam engine, and to change the engine from a forward to a back motion, or to reverse the motion with one eccentric.

SILK CLEANER.—Jules Jeannotat, Paterson, N. J.—This invention is to produce a single device for freeing silk from knots, clearing it of extra growth and all foreign substances that may have adhered to it; and it consists in the employment or use of two plates pivoted in a suitable shaped frame or stand, in such manner that their proximity to each other, or nearness of their edges, may be regulated in a single moment to accommodate different sizes of silk.

CORN AND COTTON CULTIVATOR.—A. H. Allison, Charlottesville, Ind.—This invention relates to improvement in the construction of machines for the cultivation of Indian corn, cotton, or other plants, set in rows in the field, and consists in the arrangement of the plows in connection with the frame by which they work one side of the rows of corn or cotton at a time, and are completely under the control of the driver, who is seated in the carriage frame, the parts being all simple, strong and compact.

GATE.—George McKnight, Hebron, N. Y.—This invention has for its object to furnish an improved gate, simple in construction, readily operated, and which, when lowered or opened, shuts down entirely out of the way.

BED BOTTOM.—E. M. Payne, Waverly, N. Y.—This invention has for its object to improve the construction of the improved bed bottom patented August 14, 1865, and numbered 57,181.

CHURN.—Robert T. Stanley, Charlton, Iowa.—This invention has for its object to furnish a churn by the use of which the churning may be quickly and thoroughly performed, developing and gathering all the butter that may be in the milk.

ROTARY BELLOWS.—Hiram Phinney, Kingston, N. Y.—This invention has for its object to furnish an improved rotary bellows, simple in construction, and not liable to get out of order.

MILK RACK AND TABLE. John McCoun, Lockport, N. Y. This invention consists in a combined revolving milk rack and table, so constructed that the air may have a free circulation all around the milk pans, cooling the milk more quickly, and producing more cream and better butter than when the milk is kept in the ordinary manner.

ORDNANCE PARTLY OF BRASS AND PARTLY OF STEEL.—William Webb.—The patentee takes a tube of steel or iron, having an internal diameter somewhat less than that which it is intended the finished gun shall have, and casts upon it either a coating or a series of rings of brass; or he fixes the rings by shrinking them upon it, or attaching them in any other convenient way. The result is a brass gun, lined with steel or iron.

SHEET IRON.—George Haseltine.—The object of this invention is the improvement of sheet iron, which is effected by covering it, during the process of manufacture, with a hard, compact, and smooth surface of steel, so as to render the sheets stronger, more durable, and less liable to oxidation. To the bottom and top of a "pile" is added a bar or plate of steel of the length and width of the pile. The latter is then heated to the proper degree for welding, and passed between rollers, so as to become a bar of the desired width and thickness. This bar is cut into suitable lengths, which, after having been heated, are passed between rollers a number of times sufficient to form them into plates. Then the scale produced by the heating and rolling is removed by means of a chemical bath. A series of these having been piled together, and brought to a dull red heat, are passsed between rollers to give them exactly the required thickness, and a smooth and polished surface on both sides.

GAS FOR LIGHTING AND HEATING PURPOSES.—George Russell and William Carbines.—This invention consists in the production of inflammable gas from cocoa-nut shells, fir cones, beech nuts, acorns, and Brazil nut shells with or without the nuts, by subjecting them in retorts to such a temperature as will cause their decomposition. An ammoniacal liquor containing hydrocarbons, etc., is obtained after the illuminating gas; and the residiuum is a charcoal suitable for many purposes.

PREVENTION OF BOILER EXPLOSIONS.—Edwin Bray and John Greaves.—This object is to be effected by affixing over the furnace a small chamber made of brass or some other suitable material, and fitted with, by preference, a conical valve, connected with one extremity of a lever of the first order, and a float within the boiler with the other extremity. When the water becomes too low, this float falls, the conical valve rises, and allows steam to pass from the boiler to the furnace, so as to extinguish the fire.

UTILIZING SCRAPS OF TINNED IRON.—Alfred Vincent Newton.—This is effected by compressing them in a mold, so that they may occupy a small space; placing them in crucibles along with carbonaceous substances sufficient in quantity to impart two and a half per cent. carbon to the tinned iron; subjecting the mass for a sufficient time to a proper temperature; and then casting the metal into ingots, which may be used in the same way as ordinary steel.

PREVENTING CORROSION OF SHIPS.—William Piggott.—This is effected by establishing a galvanic action between the iron of the ship and zinc, or some other metal electropositive to the iron. The electropositive metal may be either in contact or electric connection with the iron, but must be always in such a position as that it will be exposed to the action of sea water. To prevent fouling, the ship is to be placed in one electrical condition, and the sea in another, by means of any convenient form of galvanic battery.

MANUFACTURE OF IRON.—Arthur Thomas Becks.—The object of this invention is to secure to manufactured iron a smooth and clean surface, by alloying the iron with a small quantity of tin either before or after it has been converted into wrought iron. The proportions from one to ten parts by weight tin, and two hundred parts iron. The tin is, by preference, obtained from tin plate scraps. If the bloom, bar, or sheet cracks or breaks readily, either at a red heat or cold, the proportion of tin must be reduced.

ENVELOPE MACHINE.—George H. Reay, New York City.—This invention consists in the arrangement of a movable slide or arms, fitted into guide grooves, in the bed of an envelope machine, and provided with lips or studs which serve to hold the pile of blanks in position, in such a manner that by means of said sliding arms the pile of blanks can be pushed in under the pickers or gummers, or removed from under said pickers without stopping the machine or interrupting its regular motion.

WASHING MACHINE.—C. M. Mack, Brooklyn, Pa.—This invention relates to an improvement in washing machines, and consists in the arrangement of a horizontal rack frame, fitted to move up and down vertically within a box, and the contraction and expansion of springs on which the frame rests.

APPARATUS FOR EVAPORATING AND DISTILLING LIQUIDS.—Pierre T. Badoux, New York City.—This invention relates to an apparatns which is particularly intended to accelerate the evaporation or distillation of liquids or fluids of any description.

BRISTLE BOOT FOR HORSES.—John J. Davy, Newark, N. J.—This invention consists in a strap provided with radiating bristles, made from hair or other suitable material, in such a manner that a boot for horses is obtained, which is easily applied and removed, and which is not liable to wear out,

SCRUBBING MACHINE.—Andrew Irion, Femme Osage, Mo.—This invention relates to a machine which is composed of a small tank, supported by suitable wheels, and provided with a discharge spout and stopper, so that the flow of the liquid from the tank can be regulated. One of the wheels is provided with an internal gear, which meshes into a pinion mounted on the end of a crank shaft, from the crank or cranks of which suitable connection rods extend to a scrubbing brush, in such a manner that while the tank is drawn or pushed along on its wheels, a quick reciprocating motion is imparted to said scrubbing brush, and the operation of scrubbing is effected with ease and with comparatively little exertion.

TREATING LINSEED OR OTHER OIL OR FAT.—Daniel E. Breinig, New York City.—This invention consists in treating linseed or other oil or fat with metallic gum and turpentine or naphtha, in such a manner that its properties are improved, and that the same can be used with great advantage for manufacturers' and painters' purposes.

STRAP FOR ACCORDEONS.—C. T. Zimmerman, Philadelphia, Pa.—The second part of this invention relates to a strap for accordeons, which forms a double loop, one to pass round the wrist and one to admit the thumb of the hand which grasps the accordeon, in such a manner that the strap is not liable to slip on the hand, and the player is enabled to operate the accordeon without danger of losing hold of the same.

MACHINE FOR STAMPING AND EMBOSSING.—George H. Reay, New York City.—This invention relates to a machine which is intended particularly for embossing and stamping the blanks of envelopes or other articles of paper, but which can also be used for stamping articles of any other description.

BLASTING POWDER.—W. Fehleisen and Ernst Fehleinsen, Cilli, Austria.—This invention relates to an explosive compound intended particularly for blasting purposes, and composed of saw dust or other particles of wood or other cellulose material, in a finely reduced condition, to which is added saltpeter or nitrate of potassa, charcoal or carbon and prussiate of potassa, or ferro cyanite of potassium.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Parties requiring paper-collar machines will address W. H. Tolhurst, corner of Union and Fulton streets, Troy, N. Y.

Wood pump and pipe manufacturers send list of prices to T. Ibbotson, 61 Ann street, New York City.

P. R. Coleman, Goshen, N. Y., wants a machine to cut cheese box bands.

Jno. Riggin, 43 Chestnut street, St. Louis, desires to obtain a mangle.

Who are the most extensive brush manufacturers in the Union? A. Eddowes, 4,529 Franklin street, Frankford, Philadelphia, Pa.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

W. T., of C. W.—Glass, china or earthenware can be drilled with a steel drill hardened without drawing, run at high speed and the point kept wet with turpentine mixed with gum camphor.

J. L. F., of Mass.—There are no known mechanical means by which a velocity higher than 90,000 revolutions per minute can be obtained. Cotton spindles usually make from 6,000 to 7,000 turns per minute No higher velocity, we are aware of, has ever been used for manufacturing purposes. There is a limit even to our application of known mechanical laws.

G. M. C., of N. J.—1,500 feet per minute is a high velocity for a belt. Higher speeds are necessary in some cases, but as a general rule a velocity of from 1,000 to 1,200 feet per minute is high enough for real economy.

J. C., of Minn.—You say you cannot keep the joints of your iron pipe tight. Judging from your letter a portion of the pipe is exposed to all the rigors of your severe winters out of doors, while another portion is in your shop. If this is so, one portion of the pipe may be subjected to a temperature of 10 degrees below while the other is under the influence of 70 above F. There is good reason in this case for your pipe joints leaking. An iron rod one inch square raised from 32 degrees to 212 expands with a force of 35,847 pounds, or it exerts a force of 119·15 pounds for every degree F.

G. W. C., of R. I.—There is no need of a straight edge in cutting lace leather into lacets except to cut the first, or rather to trim the side. After straightening the edge take the knife in your hand, the straightened edge of the leather toward you, and use your thumb—the thumb of the right or knife-holding hand—as a guide. Holding your thumb rigid and guiding your knife by it you can cut up a side of lace leather quicker and more perfectly than by the use of a straight edge.

S. M., of N. Y.—A ready test as to the upward pressure of the atmosphere is within the reach of any one. Nearly fill a tumbler or goblet with water, not wetting the rim, and press over the top a piece of paper, closing the paper down all around the rim with the fingers. Then, holding the paper in place, invert the glass and not a particle of water will escape until the paper is saturated.

T. N. C., of N. Y.—The ordinary helix machine and the magneto-electric machine for medical purposes give to and fro currents rapidly neutralizing each other, and thus are not suitable for producing magnetic effects. But by a variation in their construction so as to give a single current in one direction they may be used in place of the battery for the telegraph and electro-plating.

G. S. P., of N. Y.—The theory that the bursting of boilers may be explained by the production of explosive gases, has been proposed a great many times. But it has no foundation in fact. Water may be decomposed by heated iron and hydrogen generated, but hydrogen of itself is no more combustible than water. There is no conceivable way that oxygen can be furnished in boilers as ordinarily constructed and operated The theory requires the simultaneous production of both.

T. D. I. of ——.—Lubricating oils are tested by applying them to journals where the amount of reduction of friction can be measured. The axis is revolved by means of a constant weight, and the reduction of friction is determined for the cases of different weights pressing down the axis. Careful experiments show that petroleum oils, answer pretty well for light weights pressing on the axis, but for the heaviest work they are not to be recommended. Sperm oil is found to be preferable to all other oils for lubrication so far as intrinsic merit goes. But on account of cheapness other oils will always be in demand.

W. B. Y., of N. Y.—Gunpowder has been used, especially in the Arctic regions, for breaking up ice. The kind of apparatus (torpedo) and the plan of proceeding should vary to suit the thickness of ice and other circumstances. Gunpowder should be used more than it is for that purpose. A few years since a steam vessel was expressly prepared to serve as an ice breaker. It operated by running its bow up on the ice and thus breaking it down.

A. D. C., of Mass.—We cannot tell you why ice is slippery. Can you tell us why sugar is sweet? There is such a thing as delving too deep in the field of science. When we reach hard pan we ought to be content. We cannot go beyond the ultimate properties of matter. They are indisputable facts, which we cannot explain.

I. L., of Ind., communicates an interesting case of spontaneous combustion. In mixing black paint (linseed oil and lampblack) an excess of lampblack was accidentally poured in from a paper package. The excess was scraped off from the surface of the paint, some of the oil adhering to it. The oiled lampblack was placed in the package and laid on the shelf. In the course of an hour the package was discovered to be on fire and blazing.

C. E. R., of N. Y.—The paste to which you allude we believe is gum tragacanth in water. There is no mucilage made with water which can dry instantly. There are plenty of solvents which evaporate more rapidly than water (alcohol, ether, benzole, chloroform, etc.) but it is doubtful if any of them would be available for common use. . . . . "Cocoanut milk pricked into the skin is said to remove india ink." So also it is said that woman's milk has the same property. The statements need confirmation.

J. P. B., of Me.—There is no water solution which can be raised to the temperature of 450° in the open air. Oil tallow or fusible metal are generally used for "baths" of temperatures above 250°. The heat should be varied to suit the nature of the different articles to be preserved.

C. W. D., of N. Y.—Water in cooling contracts till it reaches the temperature of 39°. On further cooling it expands till it becomes solid ice at 32°. Ice is therefore not formed in water till the whole mass has reached 39°, and the formation of the ice is confined to the surface. After a film of ice is formed, it increases in thickness by growth of ice on its under side, where it is in contact with the upper surface of the water. Your notion seems to be that by reason of the porosity of ice the water filters up through, freezes on the top of the ice, and that the ice grows upward instead of downward. You are wrong, and you have lost your wager.

A. M., of N. J.—"What is the smallest quantity of ground room that can be allowed chickens in confinement, fed on animal food, and the different proportions of grain, making the estimate by the 100 That depends, as the Frenchman would say. A. M. does not furnish all the data that we should require in order to venture replies which would be satisfactory to us. We beg to refer him to the wise men of the Farmers' Club, who will give him figures exact to the fraction of an inch.

J. H. P., of N. J.—There is no advantage in turning the face of pulleys crowning so long as you will keep your shafts in line and your belts straight. But this is not always possible, and as the tendency of belts as of a liquid on a revolving shaft, is by centrifugal force to traverse the part furthest from the center, so even if the two shafts are out of line slightly the belt will retain its proper position if the center of the pulley face is the highest. Sometimes it is necessary, even when shafts are leveled and lined as exactly as possible, to raise the center of a pulley to keep the belt on the pulley. This is done, generally, by putting on the pulley, around the center of the periphery, a strip of leather secured by copper rivets or by screws tapped into the rim.

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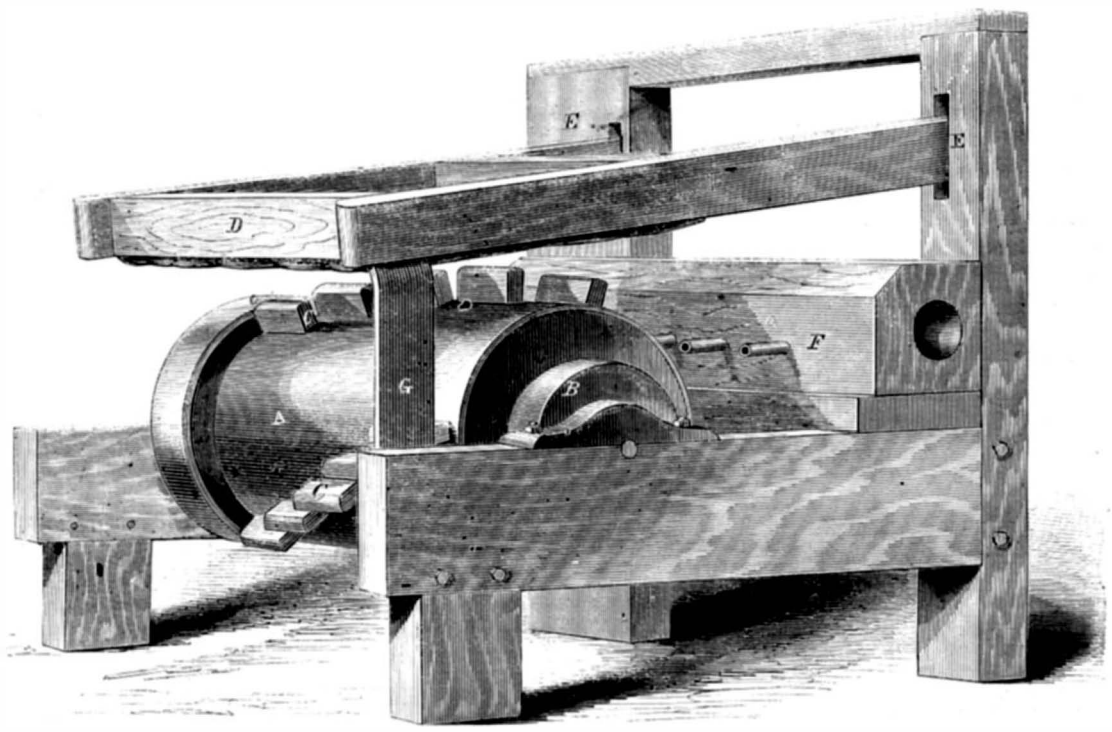
Improved Machine for Scouring Leather.

The scouring of leather has been from time immemorial effected wholly by hand. We believe, however, there are now in use devices for assisting in the more efficient contact of the stone with the hide, and the machine which is shown in the engraving is a further effort in the same direction.

It consists of a frame of suitable strength having mounted on it a drum, A, twelve inches or more in diameter, having a driving pulley, B, at one end and bearing on its surface the scouring stones, C, which are imbedded in the cylinder, the ends projecting at a uniform hight, arranged in spiral rows, and so placed in relation to each other that when the drum revolves every portion of the surface of the side of leather exposed to their action is subjected to the operation of their surfaces. On a frame, D, pivoted to the uprights, E, is an apron of leather or other suitable material, confined between the two cross bars and seen projecting below the frame, is secured. F is a reservoir of water, fed from a head and provided with pipes arranged in a row just above the center of the drum, by which streams of water may be ejected upon the leather while in process of scouring.

The operation is thus:—A side of leather is thrown by the attendant over the frame, D, the drum revolving toward him, when the stones catch the end and have a tendency to pull the side through and throw it at his feet; but he guides and controls its progress as his judgment dictates, allowing it to move as he pleases. During the operation water is to be thrown from the pipes upon it. A spring catch, G, holds the frame, D, up from the drum when no leather is passing through and the weight of the frame is not desirable.

The patent for this device is dated Dec. 4, 1866, and was obtained through the Scientific American Patent Agency for Franklin Davis, of Lawrence, Kansas, whom those interested will address for additional particulars.



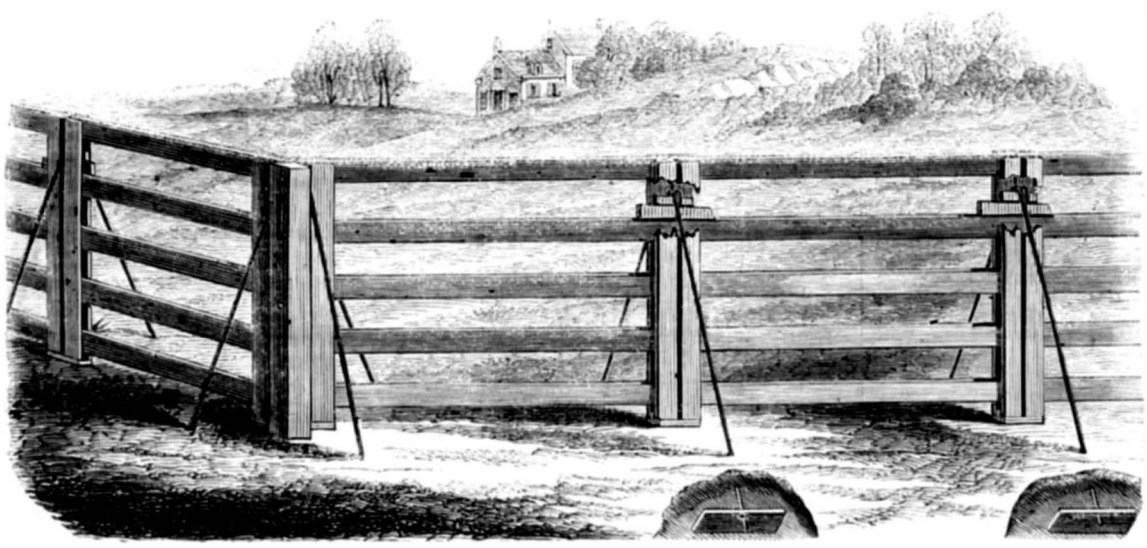
DAVIS' MACHINE FOR SCOURING LEATHER.

Improved Fence.

Farm and other fences require frequent repairs from the rotting of the posts while the superstructure has not begun to decay, and from the throw of the frost. One great item of farm labor in the spring is the fence repairing from this latter cause. The engraving gives a view of a simple fence which does not appear to be liable to these objections. There are no posts seated in the ground. The fence is built in panels or lengths under cover, during the inclement season of the year, when out door work is either impossible or inconvenient, and it can be put up rapidly without great labor.

The panels are placed end to end on a foot, which is merely a piece of board or plank, having a projecting rib rising between the upright cleats to keep the fence intact against side pressure and preserve the ends of the upright from decay by moisture. The fence is secured by guys of galvanized wire which are attached at the ends to anchors of wood, or tile, or any suitable material. These anchors are set into the ground to a sufficient depth to insure permanency. The wire takes a single turn around a block inserted between the uprights over one of the horizontal bars, and the whole affair made "taut" by a wedge-like key driven between the block and slat.

The inventor claims that the cost of this fence is much less than that of ordinary fences, and that it has a decided advantage over others in that it can be built anywhere and transported to the place of erection. It was patented by E. C. Gordon through the Scientific American Patent Agency, Dec., 1866. Further information may be obtained by addressing A. M. Towl, Sevastopol, Ind.



GORDON'S IMPROVED FENCE.

American Chilled Wheels in England.

The English still distrust the chilled cast-iron railway wheel as brittle and dangerous, and cleave to their expensive and comparatively short-lived wrought wheels. Mr. W. W. Evans, who has been for thirty years engaged in railway construction in the United States and North America, is now in England, engaged in the mission of introducing the American Chilled Wheels. Of course this is no American interest; the object being simply to induce the English to adopt for their own benefit (and to that of the manufacturer) the American way of making wheels. Mr. Evans presents to the British public, in *Engineering*, a dense array of facts and statistics on this subject, mostly well known to intelligent Americans, but some of which are worth repeating even here. The chilled wheel is used almost exclusively in the western hemisphere—in the United States, Canadas, and South America. They are also in high favor in Russia and Austria. Their peculiarly striking superiority for mountainous countries, where curves are sharp and grades are steep, renders Mr. Evans sanguine of introducing them on the mountain roads of India. Specimen sets are offered to all the English railways, free of charge until approved, and thorough public tests by breaking up wheels with sledge hammers, are employed to break up the thorough British prejudice against the article. It is a doubtful trial of endurance between two very hard substances. Three hundred and twenty swinging blows with 28-pound sledges were struck on a chilled wheel, at one of these trials, before the stout smiths could break out a piece; as many more were struck before the wheel was broken up; and the hub was not broken up but given up, as a nut too hard to crack. It was then placed under a steam hammer of great power and destroyed.

The life of the chilled wheel on the Erie railway is quoted as about 140,000 miles, and there were wheels of this kind in the International Exhibition of 1862 that had run on Canadian railways 160,000 miles. The life of the English wrought wheel, as compared with the cast, is practically but little over 30,000 miles, because after that amount of work its face is worn so uneven that it must be turned true in a lathe, at a cost about equal to that of recasting the iron wheel. The wrought wheel will stand two turnings, and sometimes three, making its total existence, with all the expense of turning; from 60,000 to 90,000 miles at the utmost.

The great English objection, the danger of breaking from frost and rough road, is turned against the wrought wheel by the facts of English railway accidents, and by the testimony of the manager of the Moscow railway, who says that they have tried every class of wheels, and found none to withstand the roughness of their road and the severity of their climate, but the chilled cast wheel, an article made by themselves of Swedish iron and very inferior to ours. They had tried twenty of the German steel wheels, last winter, and broke one fourth of them.

Care for the Feet.

Many are careless in the keeping of the feet. If they wash them once a week they think they are doing well. They do not consider that the largest pores of the system are located in the bottom of the foot, and that the most offensive matter is discharged through the pores. They wear stockings from the beginning to the end of the week without change, which become completely saturated with offensive matter. Ill health is generated by such treatment of the feet. The pores are not only repellants, but absorbents, and this fetid matter, to a greater or less extent, is taken back into the system. The feet should be washed every day with pure water only, as well as the arm pits, from which an offensive odor is also emitted, unless daily ablution is practiced. Stockings should not be worn more than a day or two at a time. They may be worn for one day, and then aired and sunned and worn another day if necessary.

Improved Insulator.

An Englishman named Hooper is reported to have perfected the application of caoutchouc for insulation of telegraphic wires, so as to supersede gutta percha by an altogether superior article. Tests for inductive resistance on a knot of the Ceylon cable core, manufactured by Mr. Hooper, showed that the time of falling from a tension of full charge to that of half charge was 300 minutes. The Atlantic cable falls in 60 or 70 minutes. The inductive resistance was to that of gutta percha as 1·36 to 1, implying that if a cable coated with gutta percha were just able to pay its expenses, when coated with caoutchouc it would yield 36 per cent of them toward a dividend. Its permanency of insulation at high temperatures is the most remarkable quality of this coating. At 212° Fah. its insulation is more tenacious than that of gutta-percha at 100°. It is manufactured at a temperature of 280°. It is also nearly impermeable to moisture even under pressure—the change in weight by absorption in three years being found to be only one per cent in thin sheets The material is first formed into massive cylinders, then shaved from the periphery by keen cutting machines into very thin long sheets, next slit into tapes, and these are served around the conductor to the thickness desired, when the mass is welded by heating. The secret of the improvement, however, is said to be in the perfect elimination of oxygen—imperfectly effected by vulcanization—which was the element that caused the gradual softening and permeability hitherto experienced in the article. It was a process of slow oxidation or decay, which has been entirely obviated. The removal of oxygen leaves the caoutchouc of its proper color, pure white.

Mending Iron Castings.

Generally when a casting breaks and cannot readily be repaired to be of its original strength by strapping with wrought iron, it is condemned. But there are cases where the the condemnation of a casting would involve the loss of a large amount of work expended upon it, especially when the casting is a heavy one and one costing much to prepare it for its work. It may not be generally known that such fractures are capable of repair by the same process that originally created the complete casting. If a mold of sand is made about the ends of the broken portions and melted iron is poured into the mold, a union may be formed if the molten iron is allowed to impinge upon the separated surfaces and then run off until they become fused, when the outward flow of iron is stopped and it allowed to fill the vacant space. The time allowed for fusing the ends of the fracture can be ascertained by feeling with an iron rod. When the iron of the original casting "gives" readily it is time to stop the outflow gate. Beds of marine engines have thus been repaired to be as good as new.

Core Making for Foundery Men.

A correspondent from Springfield, Ohio, says that cores for iron castings can be made better with sorghum skimmings and sand than by the usual rye flour, molasses, and sand. He gives this as the recipe: One quart sorghum skimmings, sixteen quarts water and sharp sand enough to make the mixture of the proper consistency. He says: "I can make more cores with one barrel of skimmings and better than most molders can with four barrels of flour."

Southern Inventors were usually lucky with their improvements until the war came on, which brought ruin and prostration upon everything. Isaac Krebs, of Virginia, patented a safety whiffletree in 1855, upon which up to the breaking out of the war he had realized sixty-five thousand dollars, the whole of which was swept away by the war save the value of some tar off acres in Texas.

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PSEUDO-SCIENTIFIC SPECULATION.

WE have received from Dr. L. Bradley a reply to our strictures upon the erratic speculation which sometimes intrudes (as we think) upon the legitimate discussions of scientific institutes. We regret that we have not room for a defence so long as the doctor sends us, but we are glad to be enabled to say that he repudiates the doctrine of atheism, and "venerates the Supreme Being and the Holy Writings as highly as we can." The heart is often wiser than the head, and if our friend can believe in God with the one and in the Eternity of Matter with the other, we can congratulate him that his sentiments are no worse or his logic no better.

But the assumption that the eternity of matter is among the accepted principles of science, or that any such thing is susceptible of proof, is one which very few scientific men will concede. There is no controversy between science and theology on this point. Be the properties and the destiny of matter what they may, no one pretends that it is impossible for them to have had a beginning and to have been constituted by the Almighty Creator "when as yet there were none of them." Let it be granted that there is no necessary direct contradiction between the eternity of matter and the statement of divine revelation that "In the beginning God created [formed] the heavens and the earth:" an essential contradiction nevertheless remains between two distinct and heterogeneous infinites, God and matter—whether matter be attempted to be conceived as an eternal emanation from or a co-eternal substance with the Deity. The escape from this contradiction is directly into Pantheism, or the identity of Nature and God: the only logical result of the doctrine of eternity or infinity of matter; involving the absurdity of a self-caused, i. e. uncaused, universe, and depriving the soul of a God to worship, love and trust, as effectually as the blankest denial of Him by name.

The common sing-song about proscribed science, Galileo, and all that, is nothing to the purpose. Nobody denies that science has helped us in many ways, and may help us still, to a better understanding of revelation. But it is quite another thing for mere speculation under the borrowed name of science, to contradict, as genuine science never has done or can, the fundamental truths that make man a moral and responsible being, and even to exclude all valid ground for his being at all.

If any one chooses to amuse himself with speculating upon the eternal activity of the Deity, and to surmise that all our sensible experience, the causes of which we call matter or properties of matter, amounts to nothing but a manifestation, relatively to our faculties, of a Divine force which has never rested from eternity and never will rest; there is nothing that we know of in science, revelation or the moral interests of the rational universe, to forbid such speculation, as speculation. But the difference between speculation of this sort and that which makes matter a true substance necessarily subsisting eternally by virtue of its own properties, is just the difference between theism and atheism. It is admitted that the dreamer of the one dream may possibly be as little an atheist at heart as the dreamer of the other: still, there is more real atheism in us than we are apt to suspect.

THE NEEDLE GUN AND THE REBELLION.

The needle gun narrowly escaped getting its first great celebrity in America. In 1861, as soon as it was determined that war was inevitable, the politicians and speculators had a grand scramble for contracts. The bepestered and bewildered war department dispensed its benefits almost regardless of consequences. Among the happy contractors whose day of fortune seemed to have come, was one who secured a contract for furnishing 10,000 needle guns at $30 each. A manufacturer was easily found who would deliver the guns at $12·50 each, and a capitalist who would furnish the money for the manufacture for half the profits. But the contractor considered such arrangements were like throwing away his contract, and that one or two hundred thousand dollars was a small reward for his patriotism. He therefore waited for something better to turn up. What did turn up was a Congressional committee for the examination of contracts. Thus the needle gun scheme and hundreds more were nipped in the bud.

A few needle guns were, however, manufactured and imported and used in the war; a few companies were supplied with them. The admirers of the needle gun tell a very good story about them. After one of the battles in which they were used, the rebel prisoners wanted to know "what kind of gun it was which the Yanks loaded up on Sunday and fired the rest of the week." But the story is so good that it may reasonably be doubted. At all events the proprietors of other breech-loaders tell the same story in favor of their favorites.

AEROLITES.

IN a contemplation of the heavenly bodies, revolving at such inconceivably remote distances from our own planet, any investigation relative to their internal structure, other than pure speculation, seems improbable. But by the aid of science this inter-planetary chasm can be spanned, and with the telescope and spectroscope the means are at our command for penetrating their orbits and acquainting ourselves with the constituents of these remote worlds. In those strange visitors which from a time prior perhaps to the age of man, through the centuries up to the present day, have fallen upon our earth, there is furnished for us tangible evidence from which we can at leisure directly investigate the characteristic formation of the distant spheres. This assertion assumes the truth of the supposition that these bodies have actually fallen upon our earth from some other planet, a view which when first proposed was received with incredulity and ridicule, but is now generally accepted by scientific men. The lunar theory considers the bodies as masses thrown out by the volcanoes of the moon with such a force that they are carried beyond her attraction and into the atmosphere of the earth.

The fact of the falling of these bodies is undeniable and has been attested on innumerable occasions by reliable witnesses. Chemical analyses prove a oneness of origin from the similarity of composition in specimens collected from all portions of the globe, and while embodying no elements not found on the earth, the combinations differ from anything belonging to the earth. In falling, meteorites have been observed shining with an intense splendor, and rushing through the air in an oblique direction with an immense velocity. When near the earth an explosion usually occurs, and the scattered fragments bury themselves deep in the ground. Showers of aërolites are on record, but fortunately for mankind the fall in great numbers is rare, and even the descent of single masses are only chronicled with the proverbial frequency of "angels' visits."

The interior of Central America and Mexico it is believed holds untold numbers of meteorites which have been stored up there for countless ages, and compared with which the specimens placed in the cabinets of the curious dwindle to the merest insignificance. The Caaba or sacred black stone in the Mohammedan temple at Mecca it is supposed is an aërolite, but a determination of this point by analysis under the existing circumstances would be attended with some hazard to the experimenter.

The announcement was made a few weeks since that the largest mass of meteoric iron ever discovered had been lately found by Professor Shepard, in Missouri, and was consigned by him to Amherst College. This statement was erroneous, this honor of owning the heaviest meteoric stone in any collection being due to Yale College.

The history of this (the Gibbs meteorite) is somewhat singular. In Dr. Bruce's Journal in 1810, the account of the varied fortunes through which this specimen has passed, is detailed at some length. It appears that two years previous to this date, the Indians of southern Louisiana, now Texas, stated that a great stone had been seen by one of their number to fall from heaven, and they volunteered to guide the curious to the place. Under the impression that this was an immense lump of platinum, two rival companies started for the spot. The mass was found as represented, and not far off they were told were two larger specimens which had been separated by the explosion. After a long series of adventures they reached New Orleans with their prize. Some time after the meteorite, as it was now proved to be, was purchased by Colonel Gibbs, brought to New York and deposited by him in trust in the Museum of the Lyceum of New York. During a removal of this cabinet the mass of meteoric iron barely escaped an ignominious consignment to oblivion by being buried by the carmen who found it too heavy for easy manipulation. The widow of Colonel Gibbs rescued it from its premature grave and generously presented it to Yale College. Before being placed on exhibition one end was sawn off and polished, and an inscription embodying the name of the donor and the weight, 1635 pounds, was engraved upon it. The mass measures three feet four and one half inches in length, by two feet four inches thick and stands sixteen inches high. In superficial area the large aërolite deposited in the Smithsonian collection exceeds it, but the weight of the latter does not equal that of the Gibbs meteorite.

AN IMPORTANT PATENT LAW QUESTION.

It appears by a decision of Judge LOTT—Supreme Court, Kings County, special term, Jan. 17—that a manufacturer taking license from a patentee is subject to the rule *caveat emptor*, and cannot recover license fees or royalty paid by him, on the ground of invalidity of patent, unless intentional fraud on the part of the patentee or his agent can be shown Cyrenus Wheeler, Jr., C. Aultman & Co., John P. Adrian, E. Ball and others, who had invented and improved various mowing and reaping machines, and obtained patents therefor which they claim cover all that constitutes a practical mowing and reaping machine at the present day, have formed an association for mutual benefit and protection, of which Mr. WM. Allen acts as the agent. On Mr. Allen's demand, Mr. Frederick Nishwitz had consented to take out a license from the associates and to pay them $500 for machines he had previously made and sold. Subsequently he discovered what he believed to be sufficient to warrant the belief that these patents were invalid, and brought suit to recover the money he had paid, and to establish his right to manufacture in future without license from these parties. A great deal of testimony was adduced on the part of plaintiff to establish the want of novelty in the inventions in question.

Judge Lott dismissed the complaint, on the ground, substantially, that the defendants were not only justified in assuming the validity of their patents and in enforcing the rights therein conferred on them, but that the plaintiff, being allowed equal opportunity with themselves to judge of the reality of the rights for which he agreed to pay the consideration in question, had by his agreement virtually waived or conceded the question of validity, and could not reopen it. It would seem, if Judge Lott is correct, that a manufacturer of articles patented by others, must take the whole responsibility of deciding on the validity of patents, so far as he is concerned, whether to disregard or to pay under them, and will suffer alone and without remedy all the penalties of legal fallibility, either way, whether he concede too much to the patentee or too little. In general, if a man takes payment for that which is not his, however innocently supposing it to be so, he is required to refund. It seems to us that there is enough to be said on both sides to render this a nice and important question. A stay of proceedings for thirty days was granted to the plaintiff, but we do not learn whether an appeal is to be taken.

OUR WATER STREETS---FERRYING, BRIDGING AND SUB-TUBING.

We have already referred to the system of ferrying business over the great water avenues of a metropolis like this, as entirely out of date, inadequate in its nature, and incapable of being improved to meet the exigencies of trade or weather and secure a safe, regular and expeditious transit at all times. The incipient struggles of the Brooklyn community for a radical reform in their mode of communication with the city, we leave to the daily chroniclers of passing events, and confine our attention to the mechanical and economical problems involved.

Plans and estimates have long since shown that a bridge can be thrown across from Brooklyn Hights say to Franklin Square, at mast-head height above the mid-channel of the East River, and made at the same time one of the most profitable pieces of road and one of the most lucrative business streets in the world. One hundred thousand persons would regularly cross that single bridge twice daily, if it were in position to-day; cheerfully paying, if need be, $4,000 a day for the privilege. The income from railway and other vehicles would be at least half as much more. Both revenues would be doubled in no long period by the stimulus afforded to traffic in this direction by such facilities. Here is ten per cent., at the start, on $22,000,000: enough to build all the bridges that could be desired from Wall street to Hell Gate; and as no expense is added by the multiplication of passengers, the profits would soon become equally great at half the present rates.

The cost of the approaches would also pay large dividends. The rental of stores and warehouses on the land portions of this highway, in both cities, would be enormous. It is even estimated that this part of the enterprise will pay enough profit to leave the bridge free, as it ought to be. Considering the improved value of the street, new or old, which will run continuous with the bridge from its terminus to Broadway, with that of the property on both the land portions of the bridge, at least five hundred lots, with their improvements present and prospective, will be at once transferred from a comparatively poor to the most valuable position, and their actual productiveness doubled or often quadrupled; directly interesting not less than $20,000,000 of present and added capital on the new route in the construction and results of the work; not to speak of the interests of Brooklyn property in general, which, thus relieved of the chronic incubus of ferry perils and delays, and brought both practically and geographically nearer to business than New York itself is, would immediately rise to the level of New York values.

With regard to plans for the construction of a bridge, little needs here be said, for nothing new is needed. All the requisite data, and a choice of numerous proved and successful plans, are at the disposal of those who may have to decide upon the *modus operandi*. It is conceded that the bridge or bridges must be at mast-head hight above high water, so as to offer no obstruction to shipping, and hence that the Brooklyn approach must commence on the Hights, or at least Prospect street, and the New York approach at the elevated ground of Franklin or Chatham Square. The water width, or length of bridge proper, would be from 1200 to 1350 feet, according to the location adopted. Two or three spans or arches will be necessary, requiring one or two immense piers in the channel,

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which will still more excite the already impetuous current of the tides in the East River. This consideration furnishes one of the strongest arguments adduced for giving preference to the sub-aqueous mode of transit. Three leading principles of structure are proposed: first, suspension; second, solid stone masonry; third, a masonry of iron cases filled with concrete, laid like blocks of stone, and anchored together by through bolts and bars. The latter method seems to meet with favor. The plans set forth propose to build from as far up as the corner of Henry and Rutgers streets, New York, to Sands and Fulton streets, Brooklyn, and to build three arches, the central one at 140 feet above high water. The location is ill judged. A landing at Franklin Square will accommodate business between New York and Brooklyn, for the present and future, better than one farther north. No matter in what direction or how far business may extend, those who go farther up town can go there after leaving the bridge, just as easily as on the bridge. The plan of a tubular bridge, like the Victoria at Montreal, or that over the Menai Strait, is also talked of by some, but is manifestly ill adapted for the immense and continuous volume of traffic that must be accommodated; besides being the form worst exposed, at that dizzy height, to lateral strain from the winds.

The costliness of a high bridge over the North River, and the objections to so multiplying bridges as to afford the fullest accommodation desirable to the several widely separated points on both shores, are difficulties to be obviated by the system of sub-aqueous tubular railways, surveys for which, as we have already stated, are now in progress under strong auspices of capital. Some of the expedients proposed by English and American engineers for locating tubular tunnels under water, may here be mentioned. The first in prominence, at present, is the plan adopted for sub-tubing the Thames in London. The tube of the Waterloo and Whitehall Pneumatic Railway, is to be built in four sections or spans of 221 feet each, supported not merely along the length of the tube in a dredged channel, but also upon piers going down to the clay. The tubes, now in course of construction by Messrs. Samuda, at the Isle of Dogs, are of ⅜ inch iron, with three rings of enveloping brickwork bound by hoops of angle iron, and are to receive, after being laid, an internal lining of brickwork bringing their diameter to 12 ft. 9 in. The length of the tubes, including shore ends, will be five eighths of a mile. The ends of each section are closed by bulkheads, and when finished, all will be floated down to Hungerford, and by a moderate admission of water will be eased down into exact position in the trench and on the foundations prepared for them. The ends will be brought into connection as lowered, by means, we presume, of guiding rods on the one, entering corresponding holes on the other, and a close joint will be effected "by means of an ingenious water-tight lock or stuffing box devised by Mr. Rammell." From which language of our English authority on that point (*Engineering*) we understand that the ends are to interlock, with suitable packing, in some way that will result in a water-tight joint for purposes of construction. It is evident that a packed joint could be forced home with any required power by the simple exhaustion of air from the shoreward section. The bulkheads can then be removed, and the joint secured and packed permanently, by means of inside flanges, ready bored with matched bolt holes. Indeed, supposing the nearer flange to be inside the bulkhead and the holes in the opposite flange to be threaded, the bolts might be inserted through without removing the bulkhead, if thought necessary or more prudent. Then, cutting away the bulkhead, the annular space between the flanges could be packed impenetrably, at leisure, or if needful in haste.

This is very likely the simplest and least expensive mode of joining the tubes at moderate depths. Others, however, have been suggested, and we shall mention last a suggestion of much promise for sub-tubing the Straits of Dover. Such things have been proposed and discussed since as long ago as 1809. Half a century is not an excessive period to elapse between the first suggestion of a great improvement and the first serious attempt to realize it. One of the best plans offered in the past, was to build a wooden coffer dam for a section of the work, by one of the variety of methods in use, commencing at the shore, and having either excavated and lined with masonry a tunnel in the river bed, or laid a tube of wrought or cast iron or wood and fully embedded it in loose rock and earth; then cross the dam with a bulkhead or new end near the termination of the finished work, and thence—removing the portion now done with—extend the dam forward to enclose a new section of the work to be done. This being substantially a well tried system, and affording clear space and leisure for the most thorough foundations, superstructure and leveling, will commend itself to careful consideration; especially if the danger of forming a bar in the harbor should compel the constructor to sink his work wholly beneath the bed of the river.

If a tube were constructed semi-cylindrical, or rather semi-elliptical in its transverse section, the flat side forming the bottom, and the vertical sides extended one or two feet beyond the bottom, so as to be forced down like a spade through the mud, it might not be difficult to join each section on its predecessor by over-lapping. The bottoms, of course, could only meet, end to end; but the water would be excluded from access to that seam, by the dam formed by the sides forced down into the river bed. Then an iron coffer, hollowed at its lower end to enclose and fit the exposed surface of the tube, might be forced down upon it and into the bed at the sides, and tightened sufficiently to give access to the joint for perfecting it. Or again, a flexible jacket being placed over the joint, the tube might be exhausted of water, the external pressure closing the joint sufficiently for purposes of construction. Yet again, it might not be particularly difficult to close and fasten the joint sufficiently by workmen in submarine armor; all the preparations being carefully made before sinking the sections.

The contrivance we have promised to refer to, recently patented by an English engineer, if as practicable as it seems, will do away most of the difficulty of submarine tubing at all depths and to all distances. His plan is that of an exterior section of tubing, enclosing and sliding over the real tube like the exterior joint of a telescope—or rather like the cap on the end of a telescope, being closed at the exposed or forward end—fitted and packed water-tight, and thus forming a sliding coffer within which the extension of the tube can be built onward indefinitely; the sliding coffer being pushed forward as the work proceeds. Commencing with a joint of tube open on the shore and capped with the sliding coffer on the water end, the shaped iron plates can be carried in, adjusted and riveted on, with due reference to the preservation of a water-tight joint with the coffer. A variety of simple expedients will occur to any mind, whereby leakage may be prevented or promptly stopped, without necessarily binding the sliding coffer so much that it could not sustain, if strongly constructed, a hydraulic pressure sufficient to force it forward with the progress of the work.

Finally, we have a most radical change—nay, revolution, and that in the arrangements of Nature herself—from the old conservative organ of business, the New York *Journal of Commerce*. When such an organ deliberately and persistently advocates a measure like that of closing up the East River from the Navy Yard to Governor's Island as a great dock, gridironed with stone piers and warehouses stretching across from either shore with mere drawbridged passages between their ends, and opened for the ingress and egress of shipping only at the pauses of the tides; does it become journals devoted to science and progress to start back in protest against the monster innovation? Certainly, in commercial circles, where the chief opposing interests exist, the proposition meets with considerable favor. It is full of advantages and benefits; yet there are two objections which will be fatal to its success. The destruction of the great water way between the east and west shores of Manhattan, and between the inland routes and the manufacturing business on the East River, will hardly be submitted to, even if the Harlem River should be opened through, ten miles northward, for a *succedaneum*. In the second place, the probable formation of bars in the harbor and the exposure of portions of the city to inundation by the concurrence of certain gales with high tides, are dangers which no legislature is likely to permit, for the sake of any convenience or advantage to be expected. We mention this, therefore, rather to complete our survey of the subject than as a practical matter.

THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS.

This is the title of an association in some few respects agreeing with those known as trades unions, but mainly quite different. While like trades unions its object is the improvements of its members, unlike them it does not seek to improve their position in regard to the amount of pay, nor attempt to dictate terms to employers. It has a nobler object and one that commends itself alike to employers and employed. It is intended to elevate the status of engineers as such, and their characters as men. No locomotive engineer who is addicted to the excessive use of stimulants, or to any other habit which interferes with the proper discharge of his responsible duties is elligible for membership. If a member grossly neglects his duties or violates the rules governing the road he runs upon, he is liable to expulsion, and several instances have occurred where this penalty has been enforced when the management of the road has not noticed the fault. The association properly regards the engineer as the most responsible man on a train, and not, as is generally considered, the conductor. There is no doubt that to the engineer the passengers are indebted for safety especially under difficulties. While the conductor should be a man of sound judgment and ready contrivance, the engineer is the official who controls the imprisoned power which may either carry the train with its living or merchantable freight to a safe issue or hurl all to remediless ruin.

The brotherhood of locomotive engineers inquires carefully into the qualifications of its members, demanding that they be capable of taking care of their machines, ascertaining and remedying defects, providing against accidents, as well as of running the locomotive. It was instituted in 1863 and its ramifications extend now nearly all over the country. Its strict management has given it a great influence among the managers of roads, so much so that it is not uncommon for an applicant for a position to be required to show his certificate from his subordinate division before his application is considered.

From an examination of the constitution and by-laws of the "Grand International Division" we are inclined to the belief that it is as valuable to railway companies and the traveling public generally as it is beneficial to the members themselves. We shall be glad to chronicle its future success or to give place to useful suggestions from its members.

Something New on Ice.

The inauguration of skating as a fashionable amusement and healthy exercise has changed the former comparatively small skate trade to huge proportions. The innumerable patterns and novel means of fastening which have been noticed in these columns, show that no small amount of ingenuity has been expended by inventors to effect the completeness of the skate. An improvement in a new line, introducing an entirely novel feature, has been lately patented by Mr. O. W. Taft, of this city. The peculiarity of this invention consists in constructing a recessed chamber beneath the foot plate or "tread" of the skate, which is lined with cork or other non-conductor of heat, and is designed to hold a piece of heated soapstone. By this means the feet are kept warm and dry, and the pleasure, health and comfort of the skater will be greatly increased. This principle is alike applicable to wood and metal skates of nearly every pattern, and interferes in no way with their use in the ordinary manner without the heating device: thus while it detracts nothing, it seems to add the great desideratum lacking in the completeness of a skate. We are sure it will be *warmly* welcomed by the lovers of the national winter sport. Address for further information Mr. O. W. Taft, No. 35 William street, New York.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 29. 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the Scientific American, New York.

61,501.—Improvement in the Eye of Wire Heddles for Looms.—John Ashworth, North Andover, Mass.

I claim a wire heddle eye for loom harnesses, made by interlocking loops of two wires, substantially as set forth.

61,502.—Boots and Shoes.—Charles W. Bailey, Boston, Mass.

I claim the heel latch, C, made as described and represented.

I also claim the arrangement of the latch, its spring, the cap and catch plates, their catch holes and catches, with each other and a heel and sole, as specified.

61,503.—Shingle Machine.—Henry D. Barnes, New Haven, Conn.

I claim the combination of the cutter, D, and the adjustable guide, H, and the spring, I, constructed and arranged to operate substantially in the manner described.

61,504.—Bedstead Fastening.—Warren S. Bartle, Newark, N. Y.

I claim the combination of the appended wrench, d, and the nut, c, with the hook, a, all as described and set forth in the foregoing as specified.

61,505.—Sash Fastener.—Burroughs Beach, West Meriden, Conn.

First, I claim the combination of the lever, E, and the cam, D, constructed respectively with arms, I and F, and so as to operate substantially in the manner described.

Second, I claim the combination of the lever, E, and cam, D, when constructed with the lip, f, and the notches, c, so as to operate to lock the cam, substantially in the manner described.

61,506.—Mode of Exhausting Air from Fruit Cans by Steam.—Darius Beardsley, Ithaca, N. Y.

First, I claim the herein described method of exhausting air from fruit cans or jars by the condensing of steam.

Second, I claim the double convex chamber extending into the steam chamber, E," for the purposes specified.

61,507.—Wagon Seat.—Jacob Beck, Williamsville, Ill.

I claim the wagon seat, A, provided with suspension rubber springs, a, in combination with a wagon box provided with two or more rods, c, substantially as and for the purposes specified.

61,508.—Plow.—Theophilus F. Bertrand and Peter Sames, Rockford, Ill.

First, We claim a vibrating coulter, when limited in its vibrations, substantially in the manner and for the purpose set forth.

Second, Adjusting the coulter vertically, substantially in the manner and for the purpose described.

61,509.—Milking Cows.—L. T. Blake, New Haven, Conn.

I claim the combination of one or more sets of rolls, c or d, rotated in the manner described, with their respective pressure plates, G or H, substantially as and for the purpose specified.

61,510.—Window-sash Supporter.—Alonzo T. Boon, Galesburg, Ill.

I claim the curved lever, C, as constructed and arranged to operate on the pivot, d, in combination with the right-angled box, a, for the control of the roller therein and its combination with the notches, f, to serve as a fastener, substantially in the manner as herein described.

61,511.—Nutmeg Grater.—William Bradley, Lynn, Mass.

I claim the combination and arrangement of the box, A, and its rotary tube, B, with the spout and rasping plate as specified, such box and tube being made with openings through their sides and with a stopping lip, b, and the plate, D, being applied to the space, C, substantially as described.

61,512. — Cultivator. — Martin Breneman, East Donegal Township, Pa., assignor to himself and Samuel Ely, Elizabethtown, Pa.

I claim the special arrangement and construction of the frame, A A' B C D, in combination with the reversible handles, F, and holes, 10 12 13 14 and 15, adapted for the reception and application of the axle and wheels, L M, scrapers, O P, all constructed and operating in the manner and for the purpose specified.

61,513.—Saw.—Ira S. Brown and Chas. N. Brown, assignors to themselves and J. Mason Gross, Providence, R. I.

We claim a saw tooth, B, so constructed as to interlock with the tooth on either side thereof, and mutually sustain and be sustained by such adjacent teeth, substantially in the manner herein set forth.

Second, We also claim the arrangement of the locking device, F f G, or equivalent mechanism, by which several or all of the teeth may be fastened by one operation, substantially as above described.

61,514.—Bee Feeding Apparatus.—Ebenezer Buel, Silver Creek, N. Y.

First, I claim the drawers, D D, for containing material for the bees to feed upon, in combination with the box, A.

Second, I claim the float, W, of perforated paper, prepared by saturation with beeswax, and buoyed with cork or other light substance.

Third, I also claim the introduction of a current of pure water into the apparatus or within access of the bees without their passing out of the hive into the open air, either under a float or through a spout with ribbed or corrugated bottom.

Fourth, I also claim the valve, V, either arranged as described, or in a fixed position.

Fifth, I also claim the apparatus for conveying water in a continued current within access of the bees in the feeding apparatus.

Sixth, I also claim the coating of my bee-feeding apparatus with beeswax, thus rendering it the better adapted to the habits and tastes of the bee.

Seventh, I also claim, in combination with the box, A, the drawers, D," the float, W," of perforated paper, the valve, V," the provision for introducing a current of pure water to pass through the apparatus, the apparatus for conveying the water, and the coating of beeswax on all the inner surfaces of the apparatus, when constructed and used for the purposes set forth.

61,515.—Churn.—William C. Chamberlain, Dubuque, Iowa.

I claim, First, The construction of the dasher of a churn of cross arms, F F', having secured to them the pieces, g g, and hinged to them the blades, h h, the latter being attached by their free ends to the arms by means of slot-

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ted stays, J j, and pins, l l, substantially in the manner herein described and or the purpose specified.

Second, The socketed angle, a a', constructed and applied to the churn box, substantially as described.

Third, The curved and grooved strips, J J, applied to the cover, G, so as to operate as set forth.

61,516.—SUGAR CANE MILL.—Orlando Clark (assignor to himself and Isaac Utter), Rockford, Ill. Antedated January 18, 1867.

I claim the arrangement in a cane mill, substantially as described, of the frame, the rollers, the feeding tube, the pan, and the scraper, for the purpose set forth.

61,517.—BALING COTTON.—Charles Colahan, Alton, Ill., assignor to himself and John Fertig.

I claim, First, The weight, C, and follower, E, in combination with the spring, g, block, e, and notches. b, substantially as and for the purpose set forth.

Second, The arrangement of the casing or frame, A, doors, B, pulley, B', rope, D, and weight, C, in combination with the notches, b, follower, E, provided with blocks, e, and spring, g, separating conjointly, substantially as and for the purpose set forth.

61,518.—SPINDLE BOLSTERS OF SPINNING FRAMES.—Jesse D. Cottrell, Milford, Mass.

I claim the combination of the separate helical bushing with the bolster, such bushing to be used therein, substantially in the manner and for the purpose described.

I also claim the bolster as made with a chamber, a, and a screw cap, C, or its equivalent, as specified, to receive and hold a helical bushing, to be arranged within the bolster and used as and for the purposes explained.

I also claim the bolster as made with the helical bushing-receiving chamber, and with a passage or notch in the lower part thereof, to lead out of the said chamber and into the oil cup when the bolster is arranged upon such a cup, as specified.

61,519.—WADDING WASTE MACHINE.—George Cox, Reading, Pa., assignor to F. Willcox and G. L. Jenkins.

First, I claim the combination of the picker cylinder, B, inclosed passage, W, feed rollers, F G, endless apron, C, and drawer, X, or their equivalents, respectively in the manner and for the purpose substantially as shown and described.

Second, The parts last mentioned in combination with the gearing for giving motion to the feed, substantially as shown and described.

61,520.—PROCESS OF FINISHING FELTED AND OTHER GOODS AND FABRICS.—Thomas Crossley, Bridgeport, Conn.

I claim a woven or felted cloth of wool, fur, silk, cotton, or other material, either dyed colored or printed, and subsequently corrugated as described, as a new article of manufacture.

61,521.—SELF ADJUSTING TRESTLE.—Henry Davis, Abingdon, Illinois.

I claim the construction and arrangement of a trestle in the manner and for the purpose herein described.

61,522.—SAFETY BRIDLE.—Daniel M. Donehoo, Beaver, Pa.

I claim the strap, G, connecting the bit ring, F, and safety rein, I, through the check strap ring, D, in combination with the gag or riding rein, K, all arranged to operate substantially as and for the purpose specified.

61,523.—WAGON.—James Dowd, Boston, Mass.

I claim the improved jigger, as made with the neck or arm, B, combined and arranged with its platform, A, the sweep frames, their supporting springs and front axle, the whole being substantially as described.

I also claim the application of the driver's seat, or the same, and the foot rest, to the arm or neck, B, extending from the platform, A, and over the front wheel sweep frames, and axle, as set forth.

61,524.—PORTABLE FENCE.—John S. Edgar, Janesville, Wis.

First, I claim the feet, B B, when constructed and used substantially as and for the purpose set forth.

Second, The combination of the feet, B B, sections, A A', and bars, C, substantially as and for the purpose set forth.

61,525.—JOINT FOR TINNED IRON VESSELS.—Horace Everett, Philadelphia, Pa.

I claim the within-described joint for tinned plate vessels, that is to say, the flange, b, and channel, x, on the plate, B, and the flange, a, on the plate, A, projecting partly across and into the said channel, and there soldered, as set forth.

61,526.—GATE.—Franklin Ewer, Honeoye Falls, N. Y.

I claim, First, The combination of a swinging gate, A, with a sliding section or panel, B, substantially as described and for the purpose specified.

Second, The combination with a swinging gate, A, and sliding section or panel, B, of the connecting arm, D, operating substantially as and for the purpose set forth.

Third, The combination of the double-acting catch, n n, with the swinging gate, A, and sliding section or panel, B, operating in the manner and for the purpose substantially as described.

61,527.—COTTON-BALE TIE.—Henry Fassman, New Orleans, La.

I claim a hoop lock constructed in the shape of a hook, and of a flat form with legs, a b, of different lengths, and a short curve or neck, c, and with or without a shoulder, d, substantially as and for the purpose set forth.

61,528.—GOVERNOR CUT-OFF FOR STEAM ENGINES.—Jacob Felber, St. Louis, Mo.

I claim, First, The cam, C', when constructed substantially as herein set forth, so as to produce a variable cut off.

Second, I claim the construction and arrangement of the balanced cut-off valve, E3, as described.

Third, The adjusting nut, E, in combination with the valve rod, E', for the purpose of regulating the opening of the ports, e', as herein set forth.

Fourth, The combination and arrangement of the cam, C', the lever, D, and the valve, E3, substantially as herein set forth.

61,529.—REFRIGERATOR.—J. R. Fergusson, Brooklyn, N. Y.

I claim the refrigerator box, with its openings, S' and t, doors, C C and J, constructed as setforth, receptacles, M M S S and R R, interior walls, P P, channel, D, and ice box, E, all arranged and used in the manner substantially as herein specified.

61,530.—WINDMILL.—F. G. Fowler, Springfield, Ill.

I claim, First, The eccentrics, c, in combination with the sails, s, hung on pivots placed on their vertical central line, and revolving in the manner and for the purpose substantially as described.

Second, The vane, V, in combination with the eccentric, c, and sails, S, arranged in the manner and for the purpose substantially as shown.

61,531.—PATTERN CHART.—Charles Freetsha, Paterson, N. J.

I claim a pattern chart composed of a series of movable blocks, the different sides of which are colored in different colors, substantially as and for the purpose herein described.

Second, The combination of the covering rods, c, with the polygonal pattern blocks, substantially as and for the purpose herein set forth.

61,532.—COMPOSITION FOR OILING WOOL.—John Gomersall, Mansfield, Mass., assignor to E. Winslow, West Roxbury, Mass.

I claim the within-described composition for dressing wool or shoddy, consisting of the ingredients mixed in the proportions, substantially as set forth.

61,533.—BUTTON-HOLE SEWING MACHINE.—E. A. Goodes and E. L. Miller, Philadelphia, Pa., assignees by mesne assignments to the American Button-hole, Cording, Braiding, and Embroiding Machine Company.

I claim the arrangement and combination herein described of the inclined vibrating needle arm, E, its eye-pointed needle, n, and the vibrating loop holder or carrier, b, for the purpose specified.

61,534.—SEEDING MACHINE.—Henry P. Gregg, Roscoe, Ohio.

I claim the valve box, B, valve, C, valve seat and measuring cup, D.

61,535.—SHUTTLE FOR NARROW WARE LOOMS.—John G. Hamilton, Clinton, Mass., assignor to George Crompton, Worcester, Mass.

I claim, in connection with a device for creating tension upon the bobbin, the arrangement of the pirn to swing, and the application of the spring to keep the pirn in normal position with respect to the shuttle, substantially as described.

61,536.—PIPE FOR WELLS.—Augustus Harrington, Warsaw, N. Y.

I claim the tube, A, having a series of four or more perforations, a, said perforations being lined with wire screens, x, in combination with the ribs, b, and spear, B, when arranged in the manner substantially as and for the purpose specified.

61,537.—NUT.—William Harris and Clinton Browning, Rush Run, Ohio.

I claim the nut, A, in combination with the stop, D, provided with a spring point, f, constructed and arranged to operate substantially as and for the purpose set forth.

61,538.—FRAME, ETC., FOR HOT-AIR REGISTERS.—C. R. Harvey, New York City.

I claim, as a new article of manufacture, a compound register frame, consisting of an exterior metallic supporting frame, provided with an exterior flange, as described, and an interior frame composed of an incombustible lead conducting material, substantially such as is described, applied to and supported by the exterior frame, substantially as set forth.

61,539.—CARPENTER'S SQUARE.—Owen T. Hayes, Hastings, Minn.

I claim a square provided with a graduated scale of angles, and one or more curved slots at the intersection of its limbs for the attachment of an adjustable plate, B, applied and operating substantially as and for the purpose specified.

61,540.—APPARATUS FOR INSTRUCTION IN TELEGRAPHING.—Edward A. Hill, Chicago, Ill.

First, I claim the combination of the two batteries, C C, with a series of wires, x y z, and their terminal points, a b c, and the movable arms, D D, connected with a wire, q, or its equivalent, arranged and operating substantially as herein specified and shown.

Second, I claim the employment of a series of escape wires, r s t u, and their terminal arms, M N O P, in combination with a plate or plates, L, connected with a ground wire, Q, arranged and operating substantially as herein shown and described.

Third, I claim the arrangement of the two terminal batteries, C C, with the circuit through the same, so as to be placed at the center of the line upon each side of the instructor's desk, substantially as and for the purposes shown and set forth.

61,541.—ROTARY LARD PRESS.—B. Hubbe, New York City.

First, I claim the lining, E, made of cloth or other suitable fabric of sufficiently fine texture for the purpose, in combination with the cylinder, A, constructed and operating in the manner set forth.

Second, The annular grate, D, lining E, and rings, l l, in combination with the bottom, F, and shaft, B, constructed and operating substantially as and for the purpose described.

61,542.—STEAM GENERATOR.—E. B. Jucket, Roxbury, Mass.

I claim the combination and arrangement of the series of tubes, E, the preplace, A, the annular chamber, G, the water vessel or drum, F, the pipes, D, the drum, B, and the discharge pipe, C, the whole being applied together substantially in the manner and so as to operate as hereinbefore set forth.

61,543.—SEED DRILL.—John F. Keller, Greencastle, Pa.

First, I claim enlarging and diminishing both the length and width of the seed holes of seed planters in order to prevent clogging and secure uniformity of discharge, whether slow or fast, substantially as set forth.

Second. I claim the arrangement and combination of two pieces, M and M', of the feed slide, substantially in the manner and for the purpose described.

Third, I claim the sharp-edged plates, R (Fig. 5), in combination with the sharp edges of the slides, M M', substantially as set forth.

Fourth, I claim the use of the half bolt, Fig. 7, for locking the strip, M to the lever, O, substantially as set forth.

61,544.—SEED PLANTER.—John F Keller, Greencastle, Pa.

First, I claim the combination of the gear wheel. L, with the pinion, M, and gear wheel, N, substantially as set forth.

Second, I claim the peculiar axle, O, with the bed plate, O', for fastening the axle to the frame, substantially as described.

Third, I claim protecting the gear wheels of wheat drills or seed planters against sticks, weeds, and other obstructions by means of a box or its equivalent, substantially as described.

61,545.—SEED PLANTER.—John F. Keller, Greencastle, Pa.

First, In the arrangement of a flexible boot or shovel plow with a lever and spring, I claim placing the fulcrum of the lever between the boot and the spring, substantially in the manner and for the purposes set forth.

Second, I claim the vibrating seat, I, for supporting the spring, in combination with the lever, substantially as set forth.

Third, I also claim the use of the washer, W, or its equivalent, in combination with the cap, S, and spring, L, substantially as described.

Fourth, I claim the above-described arrangement of the thumb screw, T, and guide pin, P, for compressing the spring, and thus increasing the tension of the same, substantially as specified.

61,546.—METHOD OF INCREASING TRACTION IN LOCOMOTIVES.—C. W. Theodore Krausch, Philadelphia, Pa.

First, I claim the means, substantially as herein described, of increasing adhesion of driving wheels of locomotive engines upon their rails, consisting in transferring a portion of the weight of a car or engine tender to the locomotive frame by the act of starting the locomotive, substantially as described.

Second, The employment of steam or other power, in conjunction with a coupling lever, S, or its equivalent, for the purpose of enabling the engineer to increase or diminish the weight upon the engine frame at pleasure, substantially as described.

61,547.—BUTTON.—Frederick Loos, Germantown, Pa.

I claim the combination of the screw, c, concave-convex disk, b, and serrated shank, B a, the said serrated shank and disk being of unequal diameter, all substantially as described for the purpose set forth.

61,548.—RAILROAD BUMPING POST.—Samuel Love, Indianapolis, Ind.

I claim the arrangement of the ground sills, 4 4, in relation to the bumping post, its timbers and braces, 1 2 3, in such a manner so that the ground sills shall extend under the railroad track, receiving thereupon the weight of the car in the manner and for the purpose herein set forth.

61,549.—IMITATION OF OPEN CARVING IN WOOD.—Willlam H. May (assignor to the Ornamental Wood Manufacturing Company), Bridgeport, Conn.

I claim, as a new manufacture, imitations of open carvings in wood made by first subjecting the wood to a pressure of dies, and subsequently cutting the wood away at the back as set forth.

61,550.—BRONZING MACHINE.—George S. Mayes, Buffalo, N. Y. Antedated January 14, 1867.

First, I claim the vertical rotary shaft, A, and brushes, C and D, as described when used in combination with the feeding mechanism of a machine for bronzing printed sheets of paper or other equivalent material.

Second, In combination therewith of one or more lights of glass, or other transparent substance for the purposes specified.

Third, The grooved roller, O, as and for the purposes described.

Fourth, In combination with the endless apron, Y, of the thumb screws, c4, the boxes, c5, plate, c6, set screws, F6, and c7, as and for the purposes described.

Fifth, The adjustable feed-wheels, A' in combination with the bands or belts as described.

61,551.—SEED SOWER.—Clark, McIntosh, Utica, N. Y.

I claim the seed sower constructed and operating substantially as described.

61,552.—CLOTH GATHERING ATTACHMENT FOR SEWING MACHINES.—Charles H. Miller, Dayton, Ohio.

First, I claim the combination of the two tension guides, b c, constructed and arranged and operating conjointly as shown and set forth for gathering one piece of cloth upon another, as they are sewed by a sewing machine, substantially as described.

Second, I claim the combination of the two tension guides, b c, with the slotted base plate, A, box, B, and set screw, D, the whole being arranged and used in the manner and for the purpose specified.

61,553.—CAR COUPLING.—Joseph Miller, Cuba, N. Y.

First, I claim draw heads, A, with interlocking hooks, m m, and flanges, n, substantially as described.

Second, The oscillating or turning hooked drawheads, A, which are adapted for having connected to them the common coupling links, substantially as described.

Third, Interlocking or hooked, turning and sliding draw bars, constructed and operating substantially on the principle herein set forth.

Fourth, The adjustable stirrup, C, in combination with the sliding wedges F, and adjusting rod, e, substantially as and for the purposes described.

Fifth, The lever or rod, connected to the lever arm, h', which latter is secured to a collar, h, through which the draw bars have an end wise movement substantially as described.

Sixth, The combination of a spring, j, with the devices which are employed for oscillating or turning the draw head and its bar, said spring being so applied as to act upon the draw heads to keep the hooks thereof together substantially as explained.

Seventh, The combination of the turning and sliding draw bars, with spring, b b, substantially as and for the purposes described.

61,554.—COMBINED PULLEY AND CABLE.—Robert Heneage, Geo. Milsom and Henry Spendelow, Buffalo, N. Y.

We claim the combination of the wire cable, H, with the grooved pulley, D, and intervening packing, i, constructed and operating substantially as described.

61,555.—VENTILATING APPARATUS FOR RAILROAD CARS.—Joseph H. Moore, Chicago, Ill.

First, I claim the fans, c, when located inside of the case, A, and rotating the perforated cylinder, B, by the same current of air that passes into the car in combination with such cylinder, constructed of netting or open work, substantially as specified.

Second, The combination of the cylinder, B, rotated by the fans, C, located inside of the case, with a water bath substantially as described.

Third, The doors, E, constructed and attached so as to operate as doors and wind gathers, substantially as specified.

Fourth, The combination and arrangement of the perforated or gage cylinder, B, with the fans, c, doors, E or F, and both with the case, A, substantially as and for the purposes specified.

61,556.—KNIFE CLEANER.—Nathan P. Mulloy, Waltham, Mass. Antedated January 19, 1867.

I claim my improved knife polisher, as made with the fork cleaner, or, in other words, the piece of leather, i, and its supporter, h, arranged and combined with the knife-polishing bed and its plunger, applied and to operate together substantially as set forth.

I also claim the combustion of the trough, K, with the knife polishing bed and plunger, applied together in manner, and so as to operate as explained.

I also claim the combination and arrangement of the leather-receiving slots, l l, with the trough, k, the bed, A, combined with the plunger as set forth.

I also claim the arrangement and combination of the apron, q, with the plunger bed and trough arranged and combined substantially as set forth.

I also claim the arrangement and combination of the guide, n, with the bed, A, and the plunger, H, when arranged and combined as and for the purpose set forth.

61,557.—COMPOSITION FOR POLISHING STOVES.—John Murphy, Brandon, Vt.

I claim the combination of the ingredients above named, as well in the proportions specified, as also in any and all other proportions, and in greater or less quantities.

I also claim the right of substituting and using any other compound made substantially of the same materials hereinbefore specified, though known by any other name.

61,558.—WASHING MACHINE.—Theron Outwater, Olcott, N. Y.

I claim the arrangement of the convex spring wash boards, B, attached to removable frames, C, and of the swinging bars, D, or equivalent, for retaining and holding open the boards; where the said parts are combined with the clothes frame, G, and gate, H, constructed as described and for the purpose set forth.

61,559.—ROLLER FOR WRINGING MACHINE.—H. D. Palmer, Cleveland, Ohio.

First, I claim the rubber or other nonabsorbent cloth, supported coverings, B b c, whether they are made or vulcanized directly upon the shaft as described, or separately, and afterward applied to the shaft, substantially as described.

Second, Securing a cover, B, upon a slotted or sectional shaft, A, by means of a divisional cloth or canvass connection, c, termini of which underlap upon the shaft as shown, substantially as described.

61,560.—STUFFING HIDES AND SKINS.—William Panton, Quincy, Mass.

I claim the hide-stuffing machine, as composed of the cylinder, A, and the steam case or box, B, made and arranged substantially in manner and so as to operate as and for the purpose stated.

61,561.—VERMIN TRAPS.—Phineas Pardee, New Haven, Conn.

I claim a case provided with opening or openings, B, beneath a plate, C, and having the entrance protected by elastic wires, or their equivalents, placed around the said opening, parallel to the entrance, and bearing upon the bottom or side of the case as and for the purpose specified.

61,562.—SELF SKIMING SORGHUM EVAPORATOR.—L. D. Perry, Laura, Ohio.

I claim the pan, A, as constructed with the divisions. 1 2 3 4, gate, B, skimming openings, D, and trough E, when arranged combined and operating as herein described and for the purposes set forth.

61,563.—MODE OF SECURING CAPS TO METAL CANS.—Daniel W. Pepper (assignor to H. Everett), Philadelphia, Pa.

I claim the can, A, with its opening, A, and flange, c, and the cap, B, with its flange, i, when the two are fitted and secured together as described.

61,564.—STEAM GENERATOR.—George W. Perry, Providence, R. I., assignor to A. Perry & Company, Boston, Mass.

I claim the improved boiler or generator as composed of a series of vessels constructed, arranged and connected in manner as hereinbefore explained, and as represented in the accompanying drawings.

I also claim each section or vessel, A, made with the convexities of the corrugations of its opposite sides to project in opposite directions with respect to each other, and with the ends and top and bottom of such vessel closed, in manner as above set forth, and as exhibited in the said drawings.

61,565.—FAGGOT FOR RAILROAD RAILS.—Samuel L. Potter, Wyandotte, Mich.

I claim a pile or faggot for railroad bars, constituted of iron and steel bars, arranged substantially as herein represented and described.

61,566.—GANG PLOW AND CULTIVATOR.—George W. Price, Bloomington, Ill.

First, I claim the combination of the vibrating beams, G G, and the braces, I I, connecting them with the draft pole, the outside plows, R K, connected by the sheaths, b b, and the rods, d d, with the beams, G G, and the inside plows, L L, connected by the swivel couplings, g g, to the standards, s s, and the rods, e e, to the braces, I I, arranged and operating substantially as and for the purposes herein described.

Second, Forming the shovels or shares, K K L L, in such a manner that if a line were drawn in its oblique section, as shown in figure 3 of the drawings, the same would stand at an angle of about 22° from the standards, b b e e, to which the shovels or shares are attached, and said plows having such a level that the point of the cutting edge when throwing inwardly, shall be upon the inside of a line continued in the direction of the length of the standards, b b e e, and said point when throwing outwardly shall be upon the outside of said line for the purpose of preventing any lateral pressure, substantially as herein set forth.

61,567.—ATMOSPHERIC CHURN.—William D. Prindle and Charles M. Yerk, Tiffin, Ohio.

First, We claim, in combination with a movable bellows. C, which is applied on the cover, B, of the churn box, we claim the pipes, b b', perforated diaphragm, F, and water chamber, G, arranged substantially as described.

Second, The construction of the air pipe, b' with a perforated foot, c, a perforated and flanged diaphragm, F, and a water receptacle, G, upon it, to be used substantially as and for the purposes described.

61,568.—STEAM ENGINE VALVE.—Thomas Rodda, St. Louis, Mo

I claim the construction of the valve with its cross piece, B' with reference to the openings and construction of the pipe, A, arranged as herein set forth.

61,569.—IRONING TABLE.—M. D. Safford, Boston, Mass.

First, I claim the combination and arrangement of the carriage, m, the legs, B B, the brace, C, and the grooved cleats, H H, or their mechanical equivalent, made substantially as described, and for the purpose set forth.

Second, The combination of the bracket D, and thumb screw, E, with the table, A, sliding legs, B B, and the brace, C, when the whole is constructed substantially as described, and for the purpose set forth.

61,570.—QUILTING FRAME.—M. Schmirk and P. McCollum, Fayette, Mo.

We claim the frame, A, the legs, B and C, the connecting piece, D, in combination with the rollers, a3, the ratchet wheels, a2, and their pawls, a5, the holes, a4 a9 a10, the hooks, a6, a7, the eyelets, a8 and b1, the pin, c1, and its corresponding holes, the hook, d, and the slit, c2.

61,571.—OIL EJECTORS.—Henry Searle, Rochester, N. Y.

First, I claim the arrangement of two or more ejectors, for raising oil or other fluids from wells and other deep places, with each other, and with pipes and cocks, or valves, substantially in the manner and for the purpose described.

Second, the arrangement of two or more cocks or equivalent valves, E F G, and E, in combination with the pipes, A and B, for the purpose of changing the action of a column of compressed air or other fluid alternately from one ejector to another, substantially in the manner and for the purpose described.

Third, The combination of the pipes, A B C D, and cocks or valves, E F G H, with independent ejectors, a and b, for the purpose of making the chamber of each ejector act alternately as a compressed air chamber, and as an exhausted receiver.

61,572.—FIRE TEST TORCH.—Geo. E. Shaw, Pittsburgh, Pa. Antedated Jan. 17, 1867.

First, I claim the torch or lamp, G, pivoted suspended or hinged to the clamp, D, or to a piece of a fire tester for carbon oil, so that it can be made to occupy either the vertical position or the horizontal position represented in figure 2 of my drawings, or any other positions between the same, in the manner substantially as set forth.

Second, The combination of the clamp, D, Screw, C, pivoted piece, E, and screw, H, with the lamp, Q, tube, T, and screw, R, to make an adjustable fire test torch, substantially as and for the purpose specified.

Third, The screw, R, in combination with the tube, T, piece, E, and clamp, B, for regulating accurately by the position of the fire band in relation to the oil undergoing the test.

61,573.—PLANING MACHINE.—Henry F. Shaw, West Roxbury, Mass.

I claim the combination of a cutter shaft, having cutters at each end, with a device for turning it end for end, and thus by crossing the band giving the shaft a reverse motion substantially as described, and for the purpose set forth.

61,574.—POTATO DIGGER.—Albert Snyder, Jackson, Mich.

First, I claim the double pronged fork, C, when constructed substantially as and for the purpose set forth.

Second, The combination of the fork, C, rods, 5 6, projecting screw, K, gearing, o o d g, when constructed and used substantially as set forth.

61,575.—WRENCH.—Philip Sommer, Newark, N. J. Antedated Jan 17, 1867.

I claim the combination of the jaws, C D staff, B, and roiler, e, constructed arranged and operating in the manner substantially as shown and described and for the purpose set forth.

61,576.—HAY KNIFF.—Philo O. Soper, San Francisco, Cal.

I claim, First, The point, A, in combination with the blade, B, to act as a self feeder.

Second, The construction of the blade, B.

Third, The bearing of the shank, C, for the uses and purposes as set forth.

61,577.—APPARATUS FOR DESULPHURIZING ORES.—J. N. Stanly, Brooklyn, N. Y.

First, I claim an oven. B, revolving arms, F F, and upright shaft, K, operated by means of gears, G G, and horizontal shaft, H, or their equivalents, substantially as described.

Second, I claim the conveying the ores or other material while being operated upon, from the central part of oven, B, to the circumference and there discharging them or from the circumference to the center as may be desired by means of conveyors, A A, connected to arms, F F, as shown on fig. 5, substantially as described.

Third, I claim the use of fire clay, plumbago or graphite enameled iron or other metals, or any other refractory material for the construction of conveyors, A A, and for the protection of the upright shaft, K, and arms, F F, that are exposed to the action of heat and gases, substantially as described.

Fourth, I claim the construction of flues, C C, underneath the oven, B, so as to give a uniform heat, also flues, D D, leading from underneath the floor and over the arch of oven, B, in its passage to the drying floor or chimney substantially as described.

Fifth, I claim a stationary floor of the oven, B, substantially as described.

Sixth, I claim the supplying the necessary oxygen for the proper treatment of ores or other material for which the oven may be adapted through the supply pipe, V, box, M, shaft, K, and arm, F F, and openings W W, through said arms, F F, and conveyors, A A, thereby preventing the arms, F F, from becoming too much heated when in action, substantially as described.

Seventh, I claim the outlet, W, for conducting gases or other volatile substances and pipe, O, with its connections to condenser, N, and the steam or air jet, Q, for the purpose of exhausting the gases, etc., from oven, B, also chambers when used in connection with their furnace which may be required for the treatment of such ores as cinnabar zinc, lead, etc., or the manufacture of sulphuric or other acids, and for conducting the same through water thence to the furnaces, T T, through pipes, P P, where both the gases and steam or air are to be used to assist combustion, when not otherwise disposed of thereby economizing fuel, substantially as and for the purposes described.

Eighth, I claim the hollow shaft, K, and arms, A A, for the purposes named in the foregoing specifications or their equivalents, substantially and for the purposes described.

61,578.—SASH FASTENER.—Joshua Stevens, Chicopee Falls, Mass. Antedated Jan. 19, 1867.

I claim the cam, b, finger or pawl, c, and plate, a, whether operated by lever or a crank all combined and arranged, substantially as described.

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61,579.—Railroad Rails.—John B. Tarr, Chicago, Ill.

I claim constructing solid railroad rail sections with tenons formed on one or both ends which are adapted to fit into the ends of rail sections having sockets them said tenons constituting part of the metal of their rails, substantially as described.

61,580.—Metallic Pavement.—John B. Tarr, Chicago, Ill.

I claim the metallic slabs, A, constructed with interlocking projections and depressions, substantially as described.

61,581.—Universal Joint.—S. N. Taylor, Horicon Wis.

First, I claim the shell, B, provided with internal radially projecting flanges, e, having their outer ends, rounded off as shown.

Second, The shell, B, in combination with the head, A, when said parts are shown as described.

61,582.—Crucible Tongs.—Fredrick Villard, Mount Eaton, Ohio.

I claim the arrangement of the bars, A, and hinged circular segments, B and C, combined together to form one or more crucible tongs, substantially described and set forth.

61,583.—Narrow ware Looms.—Sam. Walker, Boston, Mass.

First, I claim operating the shuttles of narrow looms by means of a, path cam wheel, H, in combination with the system of levers connecting rod and the cords or straps, n n', substantially as described.

Second, I claim reciprocating the guide bar and guides by means of devices such as desired or their equivalents, substantially as and for the purpose set forth.

Third, I claim the combination of the roll, r', with the levers, l and m, the sliding weight, W, and tension cord, t, arranged and operating as and for the purpose set forth.

61,584.—Mail Bag Catcher for Railroad Cars.—L. F. Ward, Elyria, Ohio.

First, I claim the combination and arrangement of mail bag catcher when attached to a railroad car in the manner and for the purpose herein set forth.

Second, The combination of the arms, B and C, with the stem, A, helical spring, S, and handle, D, in the manner and for the purpose set forth.

Third, The arrangement of the mail bag supporter consisting of the crane stem, E, braces, X and x' spring, F and e', and f', in the manner and for the purpose herein set forth.

61,585.—Ventilator for Windows, etc.—William L. Washburn, Brooklyn, N. Y.

I claim the combination with a stationary or adjustable frame, A, of two or more sets or pairs of swinging or flap valves and flanged shelves, substantially as and for the purpose hereinabove specified.

61,586.—Manufacture of Peat Fuel.—Joshua Webster, Malden, Mass.

I claim the arrangement in connection with a hopper or other crude peat receptacle, of a series of scrapers operating in connection with a stationary incline or bed, substantially as set forth.

Also and in combination with such scrapers and incline, the series of presser rolls, operating substantially as set forth.

61,587.—Combined Lantern, Foot Warmer and Water Heater.—George A. Wells, Oskaloosa, Iowa.

I claim the arrangement of the device forming a foot warmer, lantern and water heater, constructed and operating as described.

61,588.—Coverlet.—Henry Wellstein, Philadelphia, Pa.

I claim a coverlet woven substantially as herein specified, as a new article of manufacture.

61,589.—Oscillating Steam Rubber.—Lorenzo D. Wheeler, Fitchburg, Mass. Antedated, Jan. 21, 1867.

First, I claim the combination and arrangement of the clamp, F, and tube, D, with bed piece, A, slide frame, J, and slide, K, substantially as and for the purposes set forth.

Second, The combination with clamp, F, constructed as shown and described of table, D, and spring, l, substantially as and for the purposes set forth.

Third, The combination with frame, J, of slide, K, and springs, Q, as and for the purposes stated.

61,590.—Clothes Hook.—Henry M. Whitmarsh, Abington, Mass., and Silas S. Putman, Dorchester Mass.

We claim the pivoted hook, C, with its slot, e, so arranged that it may be closed up and thus occupy less space, substantially as described.

61,591.—Spoons.—Franklin W. Willard, New York City. Antedated Jan. 12, 1867.

I claim a tubular handle to the spoon for the use and purposes, substantially set forth in specification.

61,592.—Blower.—James M. Williams, Connersville, Ind.

I claim the construction of the three vaned pans, B B, used in combination with the semi-cylindrical case, A, having openings at the ends for the admission of air; and the deflecting board, d, arranged so as to leave a slot for the admission of air between it and case, A, operating in the manner and for the purpose specified.

61,593.—Gas Regulator.—Alonzo H. Wood, Boston, Mass.

I claim an automatic gas regulator attachment having the functions, and possessing the characteristics, substantially as set forth.

61,594.—Gate Latch.—Lum Woodruff, Ann Arbor, Mich.

I claim the pin, A, the rest, B, the slotted latch C, and the vertical looped rod, F, when arranged substantially in the manner and for the purposes above specified.

61,595.—Bed Bottom.—A. S. Babbit, Keeseville, N. Y.

I claim the casting A, with its ears, a a, and shoulders, x x, when constructed substantially as described and used for the purposes set forth.

61,596.—Apparatus for Generating Carbonic Acid Gas.—Steuben T. Bacon, Boston, Mass. Antedated January 17, 1867.

I claim the arrangement herein described of the apparatus for facilitating the generation of carbonic acid gas from saccharine or farinaceous matter.

61,597.—Shears.—A. B. Ball and A. G. Graves, Albany, N. Y.

We claim adjusting the knives, blades, C C, upon the jaws, B B, of the shares, substantially in the manner and for the purpose herein specified.

61,598.—Weft Bobbins.—William E. Bass, Lawrence, Mass.

I claim the improved weft bobbin as made with the series of swells, a a', a", arranged on its body as set forth.

I also claim the arrangement of the taper of the portion, b, with the series of swells, a a' a", of the body of the bobbin as set forth.

61,599.—Grinding Mill.—John H. Bear, York, Pa.

First, I claim the runner stone, G, constructed with a surface for grinding which is a segment of a sphere in any direction in which it may be intersected, in combination with the concave, E, which also is of a shape to conform to said runner stone. The said runner stone and concave being arranged and operated, substantially in the manner and for the purpose described.

Second, The arrangement of the platform, D, concave stone, E, clamp screws, c' c', and adjusting screws, C C, in combination with the vertically revolving runner stone, G, substantially in the manner and for the purpose described.

Third, The deflector, n, applied substantially in the manner and for the purpose described.

Fourth, Arranging the hopper so that its lower end rests upon the stone, E and connecting its upper end to the frame, A, by hooks or fastenings which will allow it to descend or rise with the stone, E, substantially in the manner and for the purpose described.

Fifth, The combination of the metal guards, n', and clamp screws, c' c' with the runner stone and concave, substantially in the manner and for the purpose described.

61,600.—Pendant for Watches.—John S. Birch, N. Y.

First, I claim the combination of the hollow stem, D, swivel, C, ring, B and spring top or pusher, E, substantially as and for the purposes set forth.

Second, The continuous revolving ring, B, fig. 2, in combination with the swivel, C, as and for the purpose specified.

Third, The secondary swivel bow, G, in combination with the guard bow and handle of a watch to afford an additional attachment for the guard as explained.

61,601.—Carriage Clip.—Walter Bound, Hackensack, N. J. Antedated January, 19, 1867.

First, I claim the hinged end piece, E, in combination with the bolt, D, and frame, B C, substantially as herein set forth for the purpose specified.

Second, The spring, F, provided with the lip c, and applied in relation with the hinged end piece, E, bolt, D, and frame, B C, substantially as herein set forth for the purpose specified.

61,602.—Coal Stove.—Nathaniel A. Boyton, New York City.

First, I claim the annular heating drum, A, provided with air pipes, B, and a central air space, D, substantially as described.

Second, I also claim the arrangement of the air flues, B, intermediate of the several fire flues, J, in combination with a heating drum having the form of a complete or if an incomplete annulus, substantially as described.

Third, I also claim the arrangement of the air and fire flues with reference to each other and in the manner above shown, so that at adjacent points their circles shall coincide for the purpose of preventing the lodgement of soot and ashes at their places, substantially as described.

61,603.—Jack.—A. M. Breneman, Lancaster, Pa.

I claim the manner of hinging the last, A, upon the end of the standard, B, in combination with the rest, C D, operated in the manner and for the purpose specified.

61,604.—Door and Gate Latch.—Webb Broomhall, Circleville, Ohio.

I claim a rod with its middle piston journalled and the end bent to form a catch with or without a secondary device to act upon the handle, substantially as described.

61,605.—Farm Gate.—E. and A. Buckman, East Greenbush, N. Y.

First, I claim the arrangement of the posts, B, and swivelled suspending collar, b, in relation with each other and with the gate, A, whereby the gate may be opened in either direction, substantially as herein set forth.

Second, The guide rail, e, secured at the top of the gate, beveled upward and inward on its underside from both edges and operating in relation with the tapering friction rollers, b, suspended in swivels, A', substantially as herein set forth for the purpose specified.

Third, The inclined planes, f, arranged with reference to the vertical braces, d, and supporting posts, B, of a double acting gate, substantially as herein set forth for the purpose specified.

61,606.—Carbureting Illuminating Gas.—W. H. Burridge, Cleveland, Ohio.

I claim the combination of an auxiliary gas from the organic volatile hydro-carbons with the common illuminating gas, as and for the purpose specified.

61,607.—Pipe Coupling.—William Craig, Newark, N. J.

I claim the combination of the sliding or entering butt, C, with its stud, g, elastic ring, D, and the adjacent butt-holding sleeve, A, formed with grooves, b, made to terminate in cavities or continuations, c, that verge outwardly toward the end or face of the sleeve from which said grooves started at their open extremities or mouths, all for operation together substantially as and for the purpose or purposes herein set forth.

61,608.—Take-up Mechanism for Knitting Machines.—Thomas Crane, Fort Atkinson, Wis.

First, I claim, in knitting machines, an apparatus that lifts the yarn between a stationary eye or its equivalent and the yarn carrier, or between two stationary eyes, substantially as described, so that the slack is taken up as the yarn carrier approaches the centre of the machine, and is given out as it moves from the centre.

Second, I also claim the means substantially as herein described of lifting the yarn, that is to say, a rod pivoted at one end to the yarn carrier or to the machine, while its upper part is free to slide through a stationary guide placed near the middle of the stroke of the carrier, substantially as described.

61,609.—Washing Machine.—Edmund D. Crosby, Scott, N. Y.

I claim the combination of the beaters, m m, when pivoted upon the central bar and connected to the pitman cranks by the jointed arms, c c, all as described and for the purpose set forth.

61,610.—Bed Lounge.—Richard H Cutter, Cleveland, Ohio.

I claim the combination with the folding seat, A, the mattrass, M, and the folding head, C, when constructed and operating in the manner and for the purpose herein specified.

61,611.—Window Frame.—G. K. Dearborn, South Boston, Mass.

I claim the movable parts D D', of the stop bead when combined and arranged substantially as set forth.

Second, The arrangement and construction of the parting bead, E E', made substantially as and for the purpose set forth.

61,612.—Piano Forte.—J. J. and David Decker, New York City.

First, We claim the iron plate constructed with a vertical flange, C, at its rear end, arranged in relation with the wrest plank, as and for the purpose herein specified.

Second, Interposing between the bridge, G, and portion, B, of the plate, an inclined support or shelf, H, to obtain the attachment of the strings to all or the more forward portion of the turning pins close to or at uniform distances from their wooden bearing, essentially as specified.

61,613.—Stove Pipe Damper.—Daniel De Garms, Rochester, N. Y.

I claim the arrangement in stove pipe dampers of the plates A and B, journals, j k, rib or rim, m, and recesses, c, pivot bolt, f, and openings, a b, in the manner and for the purposes set forth.

61,614.—Piston Packing.—George Dryden (assignor to himself and E. A. Prescott) Worcester, Mass.

First, I claim a packing ring consisting of the segments, b, with the spring, e, and tongues, a, constructed and arranged to operate as shown and described.

Second, In combination with the rings constructed as set forth, I claim the annular recess, k, and the slide, h, arranged to operate as described.

61,615.—Grate Bar.—Addison C. Fletcher, New York City.

First, I claim the arrangement of the connecting webs, a, of the steps in a step-formed grate bar in inclined or sloping positions, substantially as and for the purpose herein described.

Second, The facing slabs, b b, of refractory material in combination with the connecting webs of the steps of a step-formed grate bar, substantially as and for the purpose herein specified.

61,616.—Car Coupling.—Gilbert B. French, Dunbarton, N. H.

I claim as my invention or improvement, the arrangement of the spring jaws, the spring abutment and the wedged standard together and with the bunter bar and its pin passage, as set forth.

61,617.—Straw Cutter.—Warren Gale, Chicopee Falls, Mass.

I claim a revolving pressure cylinder whose pressure surfaces are faced with or made of strips of copper, or some alloy thereof possessing equivalent properties, in combination with and geared to a revolving cutter cylinder or shaft, substantially as and for the purpose herein set forth.

I also claim a spiral or oblique flanged pressure cylinder, faced with copper, in combination with a revolving knife cylinder, substantially as described.

61,618.—Tuck Marker for Sewing Machines.—H. C. Goodrich, Chicago, Ill.

I claim the tuck marker consisting of the plate, A, formed as shown, with an open space around the cloth presser to permit the cloth to lie flat on the machine, the under side presenting a plain surface, so that it may be attached to any ordinary sewing machine, and provided with the point, I, and the spring arm, B, having the notch, F, arranged to engage with the point, I, said arm being arranged to be operated by the needle bar of the machine, as herein shown and described.

61,619.—Meat Safe.—Frederick S. Gwyer (assignor to himself and Levi H. Mace) New York City.

I claim the separable meat safe with detachable parts fitted with fastenings substantially as herein specified, and adapted to be packed and transported in a small compass and with protection to the delicate portions of its structure, as herein set forth.

61,620.—Nut Fastener.—William Harris and Clinton Browning, Bush Run, Ohio.

We claim as an article of manufacture a spring metal friction yoke, constructed substantially in the manner and for the purpose herein set forth.

61,621.—Broom Head.—J. M. Hotaling, Waterport, N. Y.

I claim the combination and arrangement of the clamp, B, envelope, C, link, E, and keys, i, with the handle, D, and broom, A, as herein set forth, the whole operating in the manner and for the purpose specified.

61,622.—Cultivator.—Jacob Kessler, York County, Pa.

I claim the arrangement of the teeth, G G, as constructed with the bars, E E, rods, D and a, and the frame of the machine, as and for the purpose specified.

61,623.—Fire Place Heater.—William C. Lesster, New York City.

I claim the combination with the fire-pot, B, made up of rings mounted upon and fitting one within the other as described, of the loose flange or cap, D, constructed to enter a groove in the top ring, and resting on or lapping over the partition plate, d, of the heater, essentially as and for the purposes herein set forth.

61,624.—Device for Uncorking Bottles.—Armaud Manuel, Reims, France.

First, I claim the method of removing or breaking the wire or other clasp or tie which holds the cork in the bottle, by means of a detaching lever or equivalent device attached to and secured upon the said clasp or tie, substantially as set forth.

Second, The combination with one or more clasps or ties applied to the cork as described, of a detaching lever or similar device, under the arrangement and for operation substantially as shown and specified.

61,625.—Fishing-line Sinker.—John R. Martin, Boothbay, Maine, assignor to Samuel K. Hilton, Portland, Maine.

First, I claim the connection of a plate of copper or other hard metallic substance with a body of lead or other soft metallic substance, and the arrangement of a chamber thereinclosing weights of lead or other heavy substance, either or all of which may be removed or replaced at pleasure.

Second, The fixing firmly in the upper part of the body of a staple of copper or other metallic substance with disconnected parts (affording sufficient space for the admission of a swivel or line), and a nut or burr working upon both parts of the staple at the same time, or one part alone, so that the sinker may be detached from the line and replaced at pleasure.

61,626.—Pipe Coupling.—John Matthews, Jr., New York City.

First, I claim the method of forming a swivel or screw connection of a metallic pipe or pipes, by passing the end of the pipe through the swivel and flanging it on the face of the collar, b, substantially as and for the purposes specified.

Second, The nut, C, pipe, A, and swivel, B, having a flange or collar, b, and handle, S, permanently secured to the swivel, all arranged and combined essentially as shown and described.

61,627.—Bottling Machine.—John Matthews, Jr., New York City.

First, I claim the combination in bottling machines of perforated detachable cups or wells of different depths or sizes, essentially as and for the purpose or purposes herein set forth.

Second, The bottle screen or guard made to form a guide to the mouth or neck of the bottle, by constructing it of a conical form of shape with guiding surfaces free from horizontal interruptions or breaks, substantially as specified.

61,628.—Buckle Fastening.—Robert Meyer, Buffalo, N. Y. Antedated Jan. 19, 1867.

I claim, in combination with the case, D, the pins, H H I J, or the equivalent thereof, and the plates, R and N, as herein substantially described, the case, G, the pins, F G, and plate, M, for fastening the end of the strap in place, as described.

61,629.—Boring Tool.—James Miller, New York City.

I claim, First, The combination with adjustable slides, D, on a cutter head, B, of cutters, S S', on opposite sides of their center of rotation, and with their two cutting edges or faces, o, lying in a plane or thereabouts intersecting said center, and their outer sides, s, of a sweep not exceeding, or thereabouts, the sweep of the smallest circle they are designed to travel in, constructed and arranged substantially as specified.

Second, The combination of the adjustable cutters, S S', arranged substantially as described, with the self-adjusting center or center pin, C, and cutter head, B, essentially as herein set forth.

61,630.—Knitting Machine Needle.—Job Miller, Warren, R. I., and Jason A. Bidwell, East Boston, Mass.

We claim, First, a spring-stitch castor, hung or fastened to the shank or bar of a hooked needle in rear of the cam that lifts it.

Second, A cam arranged between the shank of the needle and the shank of the stitch caster, to raise the stitch caster at the proper time to cast the stitch, and then let it drop, so that the yarn may be fed to the hook of the needle.

Third, A stitch caster made to spring in one direction after being worked by a sliding cam, H, in the opposite direction.

61,631.—Medicine.—William Jesse Miller, Louisville, Pa.

I claim the above described composition of matter for the purposes set forth.

61,632.—Annular Petroleum Burner for Hot-air, Steam and Hydrocarbon Fluids.—George L. Moody, New York City.

I claim the burning of petroleum or a hydrocarbon fluid by injecting it into a fire box or furnace in an annular form, so that all the components are consumed, leaving no residuum and making no smoke, substantially in the manner above set forth.

Second, The adjustible orifice through which the oil is discharged, made substantially in the manner and for the purpose above described.

Third, The mechanical combination and arrangement of the different concentric pipes for the discharge of heated air, superheated steam and oil, or a hydrocarbon fluid, with the adjustable orifice, as a whole, and its application in the manner and for the purposes herein mentioned.

61,633.—Hat and Coat Holder.—Eugène J. Post, Vienna, N. J.

I claim the arrangement and combination of the hat holder and preserver with the coat hook and brackets, whether stationary or adjustable, substantially as and for the purposes herein set forth.

61,634.—Lamp Burner.—Thomas Rowatt, Jr., London, Eng.

I claim the two domes, f and l, constructed with their openings, o, increasing in width toward the base, and the opening in the outer dome broader than the opening in the inner dome in combination with their respective air passages, m, and passages, h and g, the passages to the one dome being independent of the passages to the other dome, all constructed so as to operate substantially as set forth.

61,635.—Toilet Glass.—Joseph H. Ryan, Boston, Mass.

I claim a hand toilet glass the handle of which is so attached that it may be secured in position to serve as a rest for the glass when placed upon a table, substantially as described.

61,636.—Cover and Lifting Device for Kettles.—Alexander Selkirk (assignor to himself and John Gibson), Albany, N. Y.

I claim, First, The pierced lug, E, leg, e', and T lug, E", and the hook, h, or their equivalents, in combination with the bail, c, for the purpose set forth substantially as described.

Second, The cover, B, constructed with a notched edge in whole or in part or made in open work, in combination with the lips, o o', or their equivalents, for the purpose set forth and described.

61,637.—Safety Guard for Railroad Cars.—William Siebert) assignor to himself and John Price), New York City.

I claim the arrangement of the stationary guards, F F, in combination with the axles, C, carrying bars, D, truss plate, g, and truss rod, d2, substantially as and for the purpose set forth.

61,638.—Cooling and Packing Meat.—Danl. E. Somes, Washington, D. C.

First, I claim cooling air and liquids, substantially as herein described.

Second, Cooling meat, substantially as herein described.

Third, Facilitating the salting of meat, substantially as herein described.

61,639.—Chimney Collar.—John Stokely, Hiram, Ohio.

First, I claim the chimney collar constructed of the sections, A C and D, substantially as set forth.

Second, The lap, B, for the purpose of covering the loose edge of the chimney collar, substantially as set forth.

61,640.—Valve Gear for Steam Engines.—Frederic Stratner, Wilmington, Del.

I claim the described arrangement of the slotted segment, G, rock shaft, J, adjustable block, I, pitman, E, and valve rod, A', whereby the motion of the valve may be accelerated, retarded, or suspended, as set forth.

61,641.—Elastic Mold.—Thomas Taylor, Washington, D. C.

I claim the use and application of vulcanized rubber, for the purpose herein set forth.

61,642.—Apparatus for Stacking Hay.—Charles H. Tryon, Greenwood, Ill.

I claim an improved apparatus for stacking hay and for other purposes, constructed of a central upright formed of one or more separate adjustable sections, A A', as shown in the accompanying drawings in combination with a crowning pivot plate and pin, d, revolving swivel head, G, and suitable supporting ropes or chains, a, all arranged and operating substantially in the manner and for the purpose herein described.

61,643.—Fog Signal.—Isaac Van Trump, Wilmington Del. Antedated Jan. 19, 1867.

I claim an air pipe or tube hung upon centers or a rock shaft, in combination with a whistle or whistles substantially as specified so that water or other liquid contained in said tube or pipe shall cause air to pass through the whistle or whistles when the apparatus is moved, as set forth.

61,644.—Mowing Machine.—Andrew Wemple, Chicago, Ill.

First, I claim the hollow rock shaft or bar, D, provided with arms, H, for the purposes set forth, by means of which the position of the finger bar sickle relatively to the machine will not be changed when the fingers of the finger bar are rocked up or down, substantially as specified.

Second, The attachment of the finger bar to the machine or bed, B, by a single swivel joint on one side so that the pitman can be placed in the rear of the joint or connection and attached to the head of the sickle bar in the center of the circle or arc described by the finger bar in rocking, substantially as specified and shown.

Third, The location of the joint, m, connecting the pitman with the head of the sickle or cutter bar on a level with and between the pivots, l l, of the shoe so as to bring it into the center of the rocking movement so near a line drawn from one pivot, l, to the other that it will cross such line in the cutting movements so that whether the finger bar is rocked or its end elevated or depressed the sickle and pitman will work freely, substantially as shown and specified.

Fourth, The lever, N, when so arranged and connected by the hinge, j, that it will hold the machine in an elevated position without a catch or other appliance in combination with the rod, i, and draft pole, substantially as and for the purposes specified.

61,645.—Churn.—Moses Whisler New Market, Ohio.

I claim the single faced wheel, E, in combination with the pinions, m and n, the top, B, and rings, I, the whole constructed, arranged and operating substantially as and for the purpose herein set forth.

61,646.—Horse Rake.—M. Woodman, Farmington, Me., and L. Atwood, Norwich, Conn.

We claim the combination of the elevating shafts, B, the cross shaft, B', the balls, D, and the stirrup, F, all constructed arranged and operating substantially as and for the purpose described.

61,647.—Washing Machine.—L. C. Wright, Lockport, N. Y.

I claim the combination and arrangement of the stationary, revolving roller, B, with the reciprocating rubber, C, operating in the manner and for the purpose herein set forth.

61,648.—Cement Felt for Covering Steam Boilers, Pipes, etc.—Wladyslaw T. Kosinski, New York City.

I claim and desire to secure by letters patent the new article of manufacture consisting of a plastic cement compounded of the materials or ingredients and in the manner substantially as described, and suitable for covering steam pipes, boilers, hot and cold water pipes, refrigerators, etc.

61,649.—Cultivator.—A. H. Allison, Charlottesville, Ind.

I claim the plow beams, D D, suspended to the curved guide rods, f f, and connected with the stirrups or levers, g g, for obtaining lateral movement in combination therewith and with the vertically sliding crossheads, F F, the levers, H H, and the springs, m m, constructed, arranged and operating substantially as and for the purposes therein described.

Second, The arrangement of the rotary perforated clod guards, n n, combined with the plows, b b, and beams, E D, constructed and operating as herein set forth.

61,650.—Rotary Steam Pump.—H. O. Ames, New Orleans, La.

I claim the steam wheel, A, and screw or propeller blade, M, combined together and arranged and operating substantially in the manner and for the purpose described.

61,651.—Distilling and Evaporating Liquids.—P. T. Baduox (assignor to Thos. Gannon), New York City.

I claim the arrangement of the air valve, y, pipe, z, vessel, G, pipe, n', boiler, A, condenser, C, reservoir, D, and diving bells, F F', constructed and operating substantially as and for the purpose set forth.

61,652.—Fastening for Railway-car Doors.—Henry D. Bird, Petersburg, Va.

I claim the improved mode of securing railroad-car door and making them self-fastening, by means of a hinged bar, substantially in the manner herein described.

61,653.—Preparing Linseed or Other Oils for Painting.—David E. Breinig, New York City.

claim the within-described process of treating linseed or other oils or fats

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with metalline gum and spirits of turpentine, naphtha, or other suitable liquid, substantially as and for the purposes set forth.

61,654.—TIPPING ATTACHMENT FOR POTS AND KETTLES.—Chas. Coester, Jr., and W. L. Dewey, Bridgeport, Conn.

We claim a tipping attachment for pots and kettles, constructed substantially as herein shown and described.

61,655.—BRISTLE BOOT FOR HORSES.—John J. Davy, Newark, N. J.

I claim a bristle boot for horses composed of a strap, A, with radiating bristles, C, as a new article of manufacture.

61,656.—APPARATUS FOR CARBURETTING AIR.—Bernard Douglas and Wm. H. Walton, New York City.

First, We claim the removable pans, H and I, in combination with the cylinder, A, constructed and operating substantially as described.

Second, We also claim the use of warm air for the purpose described, without the direct application of fire or steam to the apparatus, substantially as specified.

Third, We also claim the alternate arrangement of the generating pans, H and I, in the manner described, for the purpose specified.

Fourth, We also claim the apparatus so constructed that when the connecting parts of the pipes which open into the atmosphere are secured thereto, there will be no exposure to fire and evaporation be prevented, as specified.

61,657.—REVOLVING FIRE-ARMS.—R. W. Drew, Lowell, Mass.

First, I claim the tubular sliding ejector constructed and operating in the manner described.

Second, The arrangement of the hinged guard with devices for fastening the same in place, when constructed and attached to the stock or frame in relation to the perforated cylinder, all in the manner described.

61,658.—ATTACHMENT FOR HANDLES TO BRUSHES, BROOMS, ETC.—Anna Eddowes, Frankford, Pa.

I claim the handle, B, with its lower portion contracted and passing entirely through the head, A, its enlarged portion fitting in the socket tube, C, having eight angular slots, G, receiving and retaining the pin, F, secured to the handle, in the manner described, for the purpose specified.

61,659.—BLASTING POWDER.—Wilhelm Fehleisen and Ernst Fehleisen, Cilli City, Austria.

We claim a blasting compound made as set forth.

61,660.—MARKING SKIRT WIRE IN LENGTHS FOR HOOPS.—John Fraser, Williamsburgh, N. Y. Antedated Jan. 21, 1867.

I claim the method herein described of marking off skirt wire by means of a die-carrying band which, together with the skirt wire to be marked off, is exposed to the action of a suitable printing roller, substantially as herein set forth.

61,661.—CULTIVATOR.—W. K. Garrison, Abington, Ill.

I claim the frame, D, in combination with the lever, F, arranged and applied to the machine substantially in the manner as and for the purpose herein set forth,

61,662.—LIQUIDS FOR CARBURETTING GAS AND AIR.—L. E. Holden, Cleveland, Ohio.

First, I claim the combination of benzine or any other of the light hydrocarbons with colzea, rope seed, olive or other equivalent vegetable oils, for the purpose of carburetting air or gas when used for heating or illuminating purposes, substantially as specified.

Second, The combination of benzine or any of the light hydrocarbons with lard oil or its equivalent animal oil, for the purpose of carburetting air or gas when used for heating or illuminating purposes, substantially as specified.

Third, The combination of one of the light hydrocarbons with one or more animal or vegetable oils, for carbureting air or gas, substantially as specified.

Fourth, The application of the fluid made by combining one of the hydrocarbons of light gravity with one or more animal or vegetable oils to carburetting air or gas when used for heating and illuminating purposes.

61,663.—CARPET STRETCHER.—Henry Hungerford, New York City.

First, I claim a carpet stretcher so constructed and arranged that its fixed points or points of resistance against which the straining lever acts can be placed each side of or away from and beyond the line of direction of strain or tension of such straining lever, for the purposes set forth.

Second, The combination and arrangement of the lever, C, legs, A and B, and central or supporting block, E, operating severally and together substantially as and for the purposes set forth.

Third, In combination with the supporting legs, A B, or their equivalent, the arrangement of the straining lever, C, with its fastening, F, and operating substantially as set forth.

61,664.—SCRUBBING MACHINE.—Andrew Irion, Femme, Osage, Mo.

I claim the tank, A, mounted on wheels, E, in combination with the shaft, g, and brush, I, constructed and operating substantially as and for the purpose set forth.

61,665.—APPARATUS FOR CLEANING SILK THREADS.—Jules Jeannotat, Paterson, N. J.

First, I claim the plates, B B, secured to and adjustable in the stand, A, in the manner and for the purposes described.

Second, The combination of the plates, B B, stand, A, and set screws, a, substantially as herein shown and described.

Third, The combination with the silk cleaner herein described of the guide or fender, C, substantially as and for the purpose specified.

61,666.—DEVICE FOR PREVENTING HORSES FROM CRIBBING. Robert Jennings and J. A. Marshall, Bordentown, N. J.

First, We claim the spring, A, provided with the points, a a a, to prevent horses cribbing, substantially as herein described and for the purposes set forth.

Second, We claim the inside shielding spring, B, in combination with the spring, A substantially as shown and described and for the purposes set forth.

61,667.—WATER WHEEL.—A. P. Johnson, Edwards, N. Y.

I claim the tube, K, provided with the valve, J, operated automatically from the gate rod, I, substantially as shown and described.

61,668.—WASH BOARD.—Wm. A. Jordan, New Orleans, La.

I claim the springs, B, secured at their centers to the rear of the wash board and having their ends secured to the connecting rods, C, substantially as and for the purpose specified.

61,669.—PAPER COLLAR.—A. Kaufmann, New York City.

I claim as a new article of manufacture a paper collar, cuff, or similar article of wearing apparel, embossed and perforated, that portion which imitates the cambric lace portion of a textile article being tinted throughout its face, except where it is embossed, substantially as described and for the purpose set forth.

61,670.—HORSE RAKE.—Amandes Krause, West Liberty, Ohio.

First, I claim the bent lever, G, with its hooked end, and the lever, H, in combination with the rake bars, D, operating substantially as described, for the purpose specified.

Second, I claim the independent bars, D, and teeth, E, in combination with the rock shaft, F, the lever, H, and frame, A, for the purposes and substantially as described.

61,671.—STUD FASTENING.—Geo. A. Lingard, New York City.

I claim the combination with a button stud, etc., having a center screw spindle, a, of a plate or disk, B, and frame, D, when combined and arranged together substantially as and for the purpose described.

61,672.—CLOTHES-LINE REEL.—Ira E. Loughborough, Pittsford, N. Y.

I claim as a new article of manufacture the crank reel for clothes lines in combination with the ratchet, r, pawl, a, brackets, B, and casing, C, substantially as and for the purposes set forth.

61,673.—WASHING MACHINE.—C. M. Mack, Brooklyn, Pa.

I claim the rack frame, c, placed on the springs, d d, in the box, A, in combination with the follower, g, operated by the lower frame, i i, arranged and operating substantially as and for the purposes herein described.

61,674.—CULTIVATOR.—Isaac B. Mahon, Dunkirk, Ohio.

First, I claim the sliding frame, G, fitted on the rod, F, at the rear of the axle, A, in combination with the plow beams, I I, connected at their front ends by universal joints, d d, to arms, e, secured to the lower ends of the bar J, and provided with curved standards, H, which work in guides, e, attached to frame, G, substantially as and for the purpose specified.

Second, The plow beams, N N, connected by pivot bolts to the lower ends of the bar, J, and provided with curved standards, r, which work in guides, s, formed at one end of the bolts, a, which secure the arms, B, to the axle, A.

Third, The shaft, O, provided with the segments, P, to which the plow beams, I I N N, are connected by chains, Q, and also provided with a segment, P', to which a hand lever, R, is connected by a chain, S, all arranged for the purpose of raising and lowering the plows, substantially as set forth.

Fourth, The whiffletree bars, V V, having their lower ends pivoted to the lower ends of the bar, J, and their upper ends connected with the doubletree, U, substantially as and for the purpose specified.

Fifth, The securing of the plows, M, to the beams, I I, by means of the sockets, t, at the rear sides of the plows, the loose sockets, a, and the screw bolts, v, which pass through the oblong slots, w, in the beams, I I, substantially as and for the purpose set forth.

61,675.—MILK RACK AND TABLE COMBINED.—John McCoun, Lockport, N. Y.

I claim a combined revolving milk rack and table, substantially as herein shown and described.

61,676.—GATE.—G. McKnight, Hebron, N. Y.

First, I claim the combination of the gate, C, when constructed as herein described, with the ground frame or planking, A, substantially as and for the purpose set forth.

Second, The combination and arrangement of the levers, F, connecting rods, H, upright frame, E, and inclines, I, with each other, with the gate, C, and with the ground frame or planking, A, substantially as herein described and for the purpose set forth.

61,677.—ROLLER FOR WRINGER.—Charles V. Mead, Hamilton, N. J.

I claim the roller consisting of the two sections, a b, with material, c, between and completely surrounding them, and incased by the elastic covering, when constructed as herein shown and described.

61,678.—DIES FOR BENDING NOZZLES OF COFFEE POTS.—W. H. Miller, Brandenburg, Ky.

I claim the combination of the die, A, and follower, G, secured to a holder or lever, C, hinged to the die, A, and spring catch, E, or its equivalent, when arranged together and operating substantially in the manner described.

61,679.—EGG AND CREAM BEATER.—F. Oakley, London, England, assignor to himself and John Wills, Newark, N. J.

First, I claim the combination of the case, A, having the spout, d, and the disk, e, with the triangular beaters, B, of unequal length, as and for the purpose specified.

Second, The case, A, having the tube, h, bearing the shaft, g, to which the beater disk, e, is secured, and supporting the shaft independent of any other bearing, in the manner as and for the purpose specified.

61,680.—CLOTHES WRINGER.—Alby H. Page, South Boston, Mass., assignor to William B. Rhoads, N. A. Rhoads, and George J. Colby, said Colby having assigned his interest to David Lyman.

I claim, First, The combination with the standards of a wringing machine of a clamping device under an arrangement such as described, so that said machine may be adjusted to tubs of various diameters.

Second, In combination with the standards of wringing machines and clamping devices, as described, I claim the use of screws, or their equivalents, for the purpose of firmly securing the wringer after its adjustment to the tub, substantially as set forth.

Third, I claim the application of a clamping device to a wringer, with a swivel joint to adapt itself to tubs of various forms.

61,681.—FOLDING AND COT BEDSTEAD.—E. M. Payne, Waverley, N. Y.

I claim the combination and arrangement of the castors, J, and the folding legs, I, whereby the device is adapted for use as a bed bottom, trundle bed or cot, substantially as herein shown and described.

61,682.—STEAM ENGINE VALVE GEAR.—C. C. P. Peabody, Calais, Me.

I claim the construction of the link, D, and its combination with a steam engine valve movement.

I also claim the rock bar, E, the connecting rods, a a' and d, and the lever, H, arranged substantially as described, in combination with the link, D, and the eccentric, B, as and for the purposes herein set forth.

61,683.—MACHINE FOR CUTTING CANVAS, ETC.—H. H. Pember, New York City.

I claim the combination of the feed rollers, D, table or platform, O, having guide bars, Q, and cutter or knife blade, L, susceptible of adjustment, when all arranged and combined together substantially as and for the purpose described.

61,684.—ROTARY BELLOWS.—Hiram Phinney, Kingston, N. Y.

I claim an improved rotary bellows or pump formed by the combination and arrangement of the semi-cylindrical valves, C, chambered cylinder, B, cranks, H, connecting rods, I, and shafts, J and L, with each other, substantially as herein shown and described.

61,685.—CAB.—John Pol, New York City.

I claim the arrangement in covered cabs of a driver's seat behind the body of the cab, resting on a spring, c, formed as herein shown, and supported on a rear extension of the frame of a vehicle, and also a supplementary seat next the dash board, and also an opening in the back of the cover to permit communication between the driver and passengers, when the several parts are arranged in the manner herein shown.

61,686.—MACHINERY FOR STAMPING AND OTHER PURPOSES.—George H. Reay, New York City.

I claim the method herein described of producing the blow required for stamping or embossing, consisting of a fly wheel, or other equivalent device, which, after having received an impulse, produces the desired action of the punch, substantially as set forth.

61,687.—ENVELOPE MACHINE.—George H. Reay, New York City.

I claim, First, The arrangement of a slide or sliding arms, in suitable guide grooves, in the bed of an envelope machine, in combination with the pickers or gummers, constructed and operating substantially as and for the purpose set forth.

Second, Providing the bed with a ridge or depression to operate in combination with the pickers or gummers, substantially as and for the purpose described.

61,688.—STAVE JOINTER.—James F. Sayer, Macomb, N. Y.

I claim the arrangement of the swinging-plane, C, double-acting knife, B, and bed, A, operating substantially in the manner and for the purposes specified.

61,689.—SEED PLANTER.—J. Shattuck, Waterloo, N. Y.

I claim, First, The rising and falling or adjustable frame, D, placed within the frame, A, and having the hollow standard, V, attached, all arranged to operate substantially as and for the purpose set forth.

Second, The reciprocating slide rod, S, operated by the cams, T, and the wheel, C, and the spring, U, and provided with the rack g, in combination with the toothed segment, R, and the seed-dropping cylinder, Q, all arranged substantially as and for the purpose specified.

Third, The intermittingly rotating toothed cylinder, M, operated from the wheel, C, through the medium of the gearing, as shown, in combination with the hollow standard, V, attached to the adjustable frame, D, substantially as and for the purpose set forth.

Fourth, The sliding rod, Y, provided with the roller, Z, spring, m, and arm, l, and placed within the hollow standard, V, and operated from the sliding rod, S, as shown, in combination with the valves, X X, placed within the standard, substantially as and for the purpose specified.

61,690.—BARREL AND CASK.—Samuel Shea, Corry, Pa.

I claim, First, Securing the head and bottom, D and E, in the barrel by means of the flange, x, and groove, as herein described and for the purposes set forth.

Second, Securing the staves of the barrel or tank together by means of the dowell, a, feathered on both ends, in the manner as specified.

61,691.—CHURN.—Robert Stanley, Chariton, Iowa.

I claim an improved churn formed by the combination of the vertical tapering flanges or ribs, C, the triangular blades, H, horizontal arms, G, and vertical shaft, D, of the dasher, and the horizontal hand wheels, K N, and band, M, with each other and with the body, A, of the churn, substantially as herein shown and described.

61,692.—SASH FASTENER.—William H. Truesdell, Elgin, Ill.

I claim the combination of the slotted box, C, dog, D, and lever, E, when constructed and arranged as set forth.

61,693.—METHOD OF PREVENTING ACCIDENTS ON RAILROADS.—M. Wallwork, Shelbyville, Tenn., assignor to himself and James Nutt.

I claim the adjustable inclined plane, C, in combination with the plunger or rod, H, on the locomotive and connected or arranged with the throttle and whistle valves thereof to operate in the manner substantially as and for the purpose set forth.

61,694.—EXPRESS CALL SIGNS.—Joseph B. Wiesmann, Cincinnati, Ohio.

I claim the frame, A, hinged sign boards, B C C, and spring catch, b, constructed and arranged as above described and for the purpose set forth.

61,695.—ROTARY STEAM ENGINE.—James R. Willett and Livingston Brien, Nashville, Tenn.

We claim the construction and arrangement of the bucket, C, and the recess, E, with the packing pieces, h and j, spring, g, and piston, B, as herein described and set forth,

61,696.—COMPOUND OIL FOR MIXING PAINTS.—E. K. Wood and R. W. Henry, DeWitt, Iowa.

We claim the oil made of the ingredients mixed together in or about the proportions and in the manner substantially as described for the purpose specified.

61,697.—HORSE HAY FORK.—E. B. Woodruff, Morristown, N. Y.

I claim the cam lever, D, pivoted to bar, A, in combination with the catch C, and the pivoted forks, B, provided with the cross bar, d, constructed and operating substantially as described for the purpose specified.

61,698.—STRAP FOR ACCORDEON.—C. F. Zimmermann, Philadelphia, Pa.

I claim a strap for accordeons and other similar instruments forming a double loop like the figure 8, substantially as and for the purpose described.

Also the combination of the hinge joint, a, with the strap, substantially as and for the purpose set forth.

RE-ISSUES.

2,466.—BOOT TREE.—Charles T. Eames, Milford, Mass.. Patented May 27, 1856; reissued March 25th, 1852.

First, I claim the combination of the rod, D, constructed substantially as described, directly with the front, B, for the purpose specified.

Second, The arrangement together of the rod, D, the lever, H, and its spring, and the front, B, substantially as described.

Third, A boot tree constructed in two parts, A and B, when such parts are combined by means of a rod, cam and incline, substantially as and for the purpose specified.

Fourth, The use in a boot tree of a single cam and incline, when the cam is attached to the lower end of stretching rod, and traverses upon the inclined plane located in the back at or near its lower end, and operating substantially as described.

2,467.—SEEDING MACHINE.—W. P. Penn, Belleville, Ill. Patented Dec. 27, 1859.

First, I claim so combining a grain hopper and a grass seed hopper in a seeding machine that the grass seed hopper, being in front of the grain hopper, shall distribute its seed in advance of the grain and amidst of the rolling earth, as it is lifted by the teeth of the drill, substantially as and for the purpose specified.

Second, So combining a deflector with a grass and grain seed hopper, combined as specified, that said deflector shall deliver the grass seed in advance of the grain, and upon the upturning earth, substantially as and for the purpose specified.

2,468.—MODE OF PREPARING CHEWING TOBACCO.—C. W. Sweet and John F. Greene, New York City, assignees of Henry D. Smith. Patented March 14, 1865.

We claim enveloping the fine-cut tobacco in tobacco leaves or the equivalent thereof, and subjecting it when enveloped to pressure, substantially as described, and for the purpose set forth.

2,469.—HARVESTER RAKE.—Adam R. Reese, Phillipsburg, N. J, assignees by mesne assignments of A. R. Reese, W. Gould and N. Lake. Patented Nov. 5, 1861.

First, I claim the combination of an endless chain with a pulley on the main shaft, having projections which enter into the links of the chain, and the corresponding pulley geared to the revolving rake and reel shaft, substantially as described.

Second, Supporting the revolving rake and reel upon a detachable frame, so that the entire raking and reeling apparatus can be bodily removed without disarrangement of parts, for the purpose of converting the machine from a reaper to a mower.

Third, The combination with a harvester of the removable revolving rake and reel frame with the raker's seat or support, so as to give the machine a capacity to be converted from an automatic to a hand raker.

2,470.—APPARATUS FOR DISTILLING PETROLEUM AND OTHER LIQUIDS.—C. H. Hall, Binghampton, N. Y. Patented June 36, 1866.

First, I claim, in the continuous distillation of petroleum or other liquids, the use of a retort, B, in combination with furnace, D, and arch, C, substantially as shown and described, and for the purpose set forth.

Second, Passing the liquid to be distilled through the retort in the form of a thin stratum, substantially as and for the purpose described.

Third, The device herein described for generating steam, consisting of the water jacket, G, and water supply pipe, Y, and steam tube, I, in combination with condensing tube, F, substantially as shown and described, or any other means whereby steam is generated by passing the vapors of oil or other liquids being distilled through a vessel containing water, or vice versa.

Fourth, The method herein described of separating the condensable vapors from the non-condensable gases, or any other method whereby the condensable vapors are made to collect in the lower part of a receiver, while the non-condensable gases are made to pass off by the suction of a current of steam substantially as herein set forth, and for the purpose specified.

Fifth, The water jacket, G', connected with supply pipe, H, and water tank, R, in combination with tubular condenser, E, operating as described, or in any other manner to accomplish the purpose specified.

Sixth, The receiver, L, in combination with tubular condensor, F, steam pipe, K, and discharge pipe, O, operating substantially as and for the purpose shown and described.

Seventh, The annular chamber, E, composed by an inner and outer vessel, in combination with the condenser, F, constructed and operating substantially as and for the purpose specified.

Eighth, The method herein described of freeing the retort, B, from residuum, or any other equivalent means whereby a retort or still is freed of its residuum, by the force of a jet of steam, operating substantially as shown and described.

Ninth, The within-described process of cleaning the residuum by treating it with steam and water, substantially in the manner described and for the purpose set forth.

2,471.—SAWING MACHINE.—Sparrow M. Nickerson, Chicago, Ill., assignee of Calvin J. Holman. Patented Dec. 8, 1863.

First, I claim supporting the saw upon the rollers, a p, within the saw, one of which is adjustable, so as to adapt the rollers to the wearing out of the saw, substantially as herein described.

Second, I claim so arranging the saw, A, upon interior supporting rollers and their shafts in such a manner that the saw, A, revolved by a band passing around it as before mentioned, will communicate power, through the medium of the interior rollers and shafts, to other parts of the machine or other machines, substantially as herein specified and shown.

EXTENSION NOTICES.

Alfred J. Watts, of Brooklyn, N. Y., petitions or the extension of a patent granted to him the 26th day of April, 1853, for an improvement in processes for preparing gold, for seven years from the expiration of said patent, which takes place on the 26th day of April, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 8th day of April next.

James S. Taylor, of Danbury, Conn., having petitioned for the extension of a patent granted to him the 3d day of May, 1853, for an improvement in machines for shrinking hat bodies, for seven years from the expiration of said patent, which takes place on the 3d day of May, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 15th day of April next.

John Mee, of Lowell, Mass., having petitioned for the extension of a patent granted to him the 10th day of May, 1853, for an improvement in knitting looms, for seven years from the expiration of said patent, which takes place on the 10th day of May, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 22d day of April next.

John Mee, of Lowell, Mass., having petitioned for the extension of a patent granted to him the 10th day of May, 1853, for an improvement in warp net fabrics, for seven years from the expiration of said patent, which takes place on the 10th day of May, 1867, it is ordered that the said petition be heard at the patent Office on Monday, the 22d day of April next.

Rollin White, formerly of Springfield, Mass., but now of Lowell, Mass., petitions for the extension of a patent granted to him on the 3d day of April, 1855, and reissued to him, in three divisions, on the 27th day of October, 1863, for an improvement in repeating fire-arms, for seven years from the expiration of said patent, which takes place on the third day of April, 1869, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of May next.

THE MARKETS.

Throughout the country, in most branches of industry, comes the same report of the torpidness of trade at a period of the year when it should be the most active. This stational inertness must be largely due to the high prices of commodities brought about by the waste of war, excessive internal taxation, a badly constructed tariff, and a debased currency. A wonderful unanimity of public sentiment seems to exist on the subject of taxes, and the general opinion seems prevalent that business prosperity must be unknown until some material reduction takes places. From present appearances the spring trade will be considerably below that of last year in most departments of business.

COTTON.—The exports from this port, for last month, were 48,525 bales, showing a falling off of 3,367 bales from the shipments of January, 1866. The demand at this date has become very light owing to lower quotations from Liverpool.

From the annual cotton report of Europe, published in the *Shipping List*, it appears that while Great Britain has not yet reached the consuming powers of 1860—when enormous purchases were made by speculators anticipating a cessation of supplies—the Continental countries have required during the year much larger supplies than before the wars. In France a uniformly good trade has been done, the mills being kept fully at work with fair profits. The cotton industry of Germany has been on the whole in a satisfactory state; the same statement applies equally well to Belgium. Spain has largely increased her manufactories, and the manufacturing demand in Russia has been and is now very brisk.

DRY GOODS.—The imports for the month of January amount in value to twelve million dollars, less than nine millions of which were thrown upon the market owing to the dullness of trade during the month. This season last year was the center of a very large import trade, exceeding fifteen millions, and fourteen and half millions were marketed. There seems to exist no probability that the imports of the current year will equal last year's total.

WOOL TRADE.—The passage of the Tariff Bill by the Senate has caused greater firmness on the part of holders, who, in most cases, demand higher prices for foreign.

A statement made to the Senate Committee on Agriculture, by J. B. Dodge, statistician of the Agricultural Department, declares the annual consumption of unscoured wool in the United States to be little more than one-third of the estimate made in the recent special revenue report. It makes the total wool supply of the four years of war, ending June 30, 1865, about 800,000,000 lbs., of which three-eighths were produced in this country, 279,000,000 lbs. imported, and an equivalent of 220,000,000 lbs. introduced as manufactured woolens. It makes the annual consumption of the loyal States, during the war, 7 lbs. per capita, instead of 4½ lbs. prior to the war, showing an increase of 55 per cent from the waste of war and the scarcity of cotton.

METALS.—In copper we note: New sheating and yellow metal steady at 40 and 20 cents, net cash, respectively; Ingot remains dull, and prices still recede. Owing to local impedients the trade of the port in pig iron is reduced to a very small compass; the demand, however, at this season, is usually small. The market for pig tin remains very quiet but firm; business in all descriptions is light. Consequent upon the passage of the Tariff Bill through the Senate, there is more disposition for the purchase of pig lead, but holders are not so willing to sell, and the market is at a stand. Zinc is very dull, and quotations are merely nominal

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Reissued patents expire at the same time that the original patent would have done. For this reason, applications for reissue will be acted upon immediately after they are completed.

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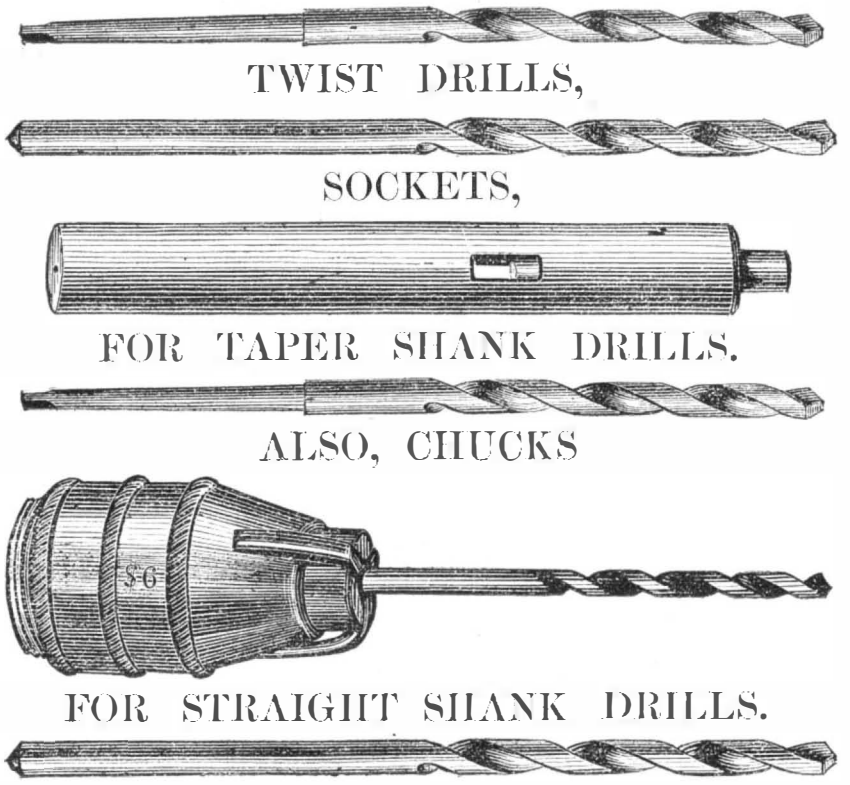

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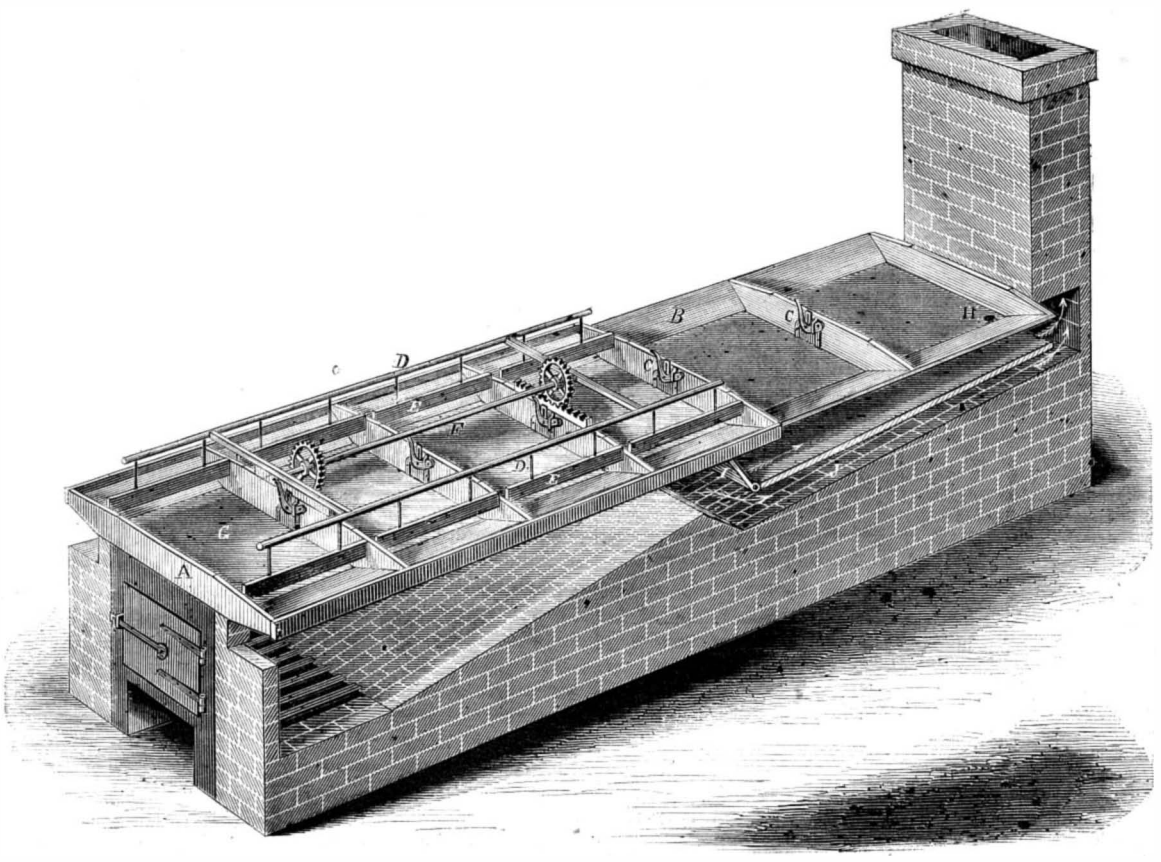
Improved Sirup Defecator and Finisher.

The cultivation and manufacture of the Chinese cane or sorghum into sirup and sugars has within a few years attained considerable importance in western sections of the country. Inventors have been busy in improving the apparatus by which the crude juice is manufactured into sirup and granulated into sugar. The device represented in the engraving, it is said, can, by the aid of one operator, make from 80 to 100 gallons of honey-like sirup in 12 hours, which contains less vegetable matter preventive of granulation than that made in the ordinary manner.

The defecator proper, A, is a part of the finisher, B, but separated from it by a partition. The defecator, also, as well as the finisher, is subdivided by transverse partitions as seen in in the engraving. These partitions may be either connected or kept separate by simple gates, C, which are vertical slides worked by a handle lever. The arrangements for removing the scum from the heated juice are a peculiarity in this machine. Long side arms, D, with cleats, E, attached, are secured to cross bars resting at their centers on a shaft, F, carrying either gear wheels or toothed segments which mesh into racks fixed on two of the transverse partitions.

The defecating and finishing pans with their attachments rests on a furnace, part of one side of which is removed to show the internal arrangement. The operation is as follows: A constant stream of the juice is introduced into the front compartment, G, over the grate, and by the gates, C, is passed along through the other compartments, until it reaches the last finishing pan and is discharged at H by means of a pipe. The sides of the defecator are inclined at an obtuse angle and as the syrup boils the scum rises and tends toward the sides. When a quantity has gathered the operator slides the skimmer to the edge of the floating mass, and depressing or raising the arm which he grasps, he pushes the scum up the inclined edge of the pan to remove it one side, and pulls it toward him to remove it from the other. The scum falls into side channels and is carried off by gutters or any suitable conduit.

When the syrup is sufficiently cleansed and boiled it is passed from the defecator to the finishing pan by the gates, C, and when to be drawn off at H, the damper, I, is raised, as seen in the engraving, which directs the flame and gases from the furnace to the lower passage, J, by which the finished syrup is kept from burning.



BOWLES' SIRUP DEFECATOR AND FINISHER.

All communications for further information should be addressed to J. A. Bowles, Fremont, Ohio.

Improvements in Iron Manufacture.

The manufacture of pig iron in the North of England (says *Engineering*) has been further cheapened, the past year, by the erection of still larger and higher furnaces: the highest being 102 feet, with a capacity of 26,000 cubic feet. The gas is now wholly taken off and burned under the boilers and stoves, so that there is absolutely no flame from the tops of the furnaces. The temperature of the blast has been increased to 1100 degrees and upwards. So far, there is no known means of driving out all phosphorus from iron. Any means which would do so would add more than one hundred millions of wealth to this nation (England) by enabling ordinary irons to be converted into excellent steel by the Bessemer process.

Rush for Steel Rails.—On the London and Northwestern Railway there are now nearly one nundred miles laid with steel rails. Several of the steel rail-maker in and near Sheffield are driven night and day with orders, and have work on hand for a year to come.

Preservation of Ships.—Iron hulls are to be protected from fouling and oxidation by placing them in electrical connection with a strip of zinc placed directly on the hull under water, or by giving the hull an opposite electrical condition to that of the sea, by means of insulated strips of zinc at the stem and stern-post respectively, connected with a battery within the ship, and thus maintaining opposite electrical currents over the surface of the hull. It is asserted that the polarity of the ship will also be neutralized in this way, and the great difficulty, "local attraction," will be overcome. We don't suppose this is anything like the secret of Captain Morris, of Boston (not Martin, as our types carelessly named him the other day), as it smacks of the *savans*, and is patented by W. P. Pigott, of London. By the by, cannot Captain Morris's idea be patented? We stand ready to give a confidential opinion on that point, according to our custom, without charge. Will Captain Forbes look into it?

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If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

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In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions,—smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, $16. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is $25, for the simplest cases, up to $35, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, $20 more is paid the Government, making a total of $61 for the simplest case.

The model should be neatly made of any suitable materials, strongly fastened, without glue, varnished or painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

New medicines or medical compounds, and useful mixtures of all kinds, are patentable.

When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

The average time required to procure a patent is six weeks. We frequently get them through in less time; but in other cases, owing to delay on the part of the officials, the period is sometimes extended to two or three months, and even more. We make a special point to forward our cases as RAPIDLY AS POSSIBLE.

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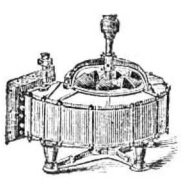

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